Newark Shop Notebook, Cat. 1172

This notebook covers the periods July 1871–February 1872 and April 1874–August 1875, with the majority of entries falling in 1875. The notes and drawings are in the hand of Thomas Edison and Charles Batchelor and deal with the development of the electric pen, electromotograph, automatic printing and chemical telegraphy, and multiplex telegraphy. There are many tests of chemical solutions and a few notes on battery and other experiments. Tapes treated with chemicals are affixed to pages 204–206, 208–210, and 212–213; examples of printed tape are on pages 289 and 290; samples of reproductions done by the electric pen are glued onto pages 228, 236, 238, and 254. Some of the experiments are signed and dated by Edison and Batchelor, and the names of Joseph Murray, Edward H. Johnson, Samuel Edison, James Adams, and Ezra T. Gilliland appear as witnesses. The book contains 294 numbered pages.

Blank pages not filmed: 34–35, 44–59, 94–125, 128–133, 136–157, 182–199, 242–243, 292–293.

Missing pages: 215–216, 251–252, 277–278.

Cabinet 578
Shelf 3

No Zeitfuchs

E1676
Cat 1172

Thomas A. Edison

Inventor

Telegraphic Apparatus

Thomas A. Edison

Inventor

Telegraph Apparatus

Umbrella Machine

Machine Machines

A Machines

Menlo Park Telegraph Co.

— Messenger Book —

Date	To —	address	Time
18.9 63/4	Edison	1 Laboratory ave	T A Edison 5 30 P.M.

Index

Tellurium 38

Automatic Printing. Telegraph. = Newark N.J. July 29. 1869

Invented by and for myself exclusively.

E-1676

Daily record of ideas as they occur applicable to this system, and a record of ideas already conceived, and account of experiments -

Dot (.) Dash (—) Automatic Printing Translating System, Invented for myself exclusively, and not for any small brained capitalist,

The general plan of this system is this:-

I propose to perforate or punch ~~in by~~ in paper in strips Roman Characters, by dies and punches, a punch and die of each Letter of the Alphabet, and made on the stencil principle = The Machine which I am about to describe will be provided with 30 Keys the depression of any one cutting out a Letter, after the manner of a stencil, and at the same time feed the paper ahead the distance of one Letter = ready for the next = After a strip of paper containing a message has been punched in this manner it is taken to a Sending Apparatus for transmission over the Line = This apparatus will be as follows = The Machine will have a paper carrying drum revolved by a weight or by magnetism, over the drum and revolving at right angles with it is another drum having ~~a springs~~ a number of springs in the same circle radiating off of the drum and all Connected to the Main Line when the Machine is in motion both drum revolve the paper carrying drum very slowly & the drum carrying the springs very fast = The drum upon which the paper is carried being connected to the battery Every time a spring passes over a portion of the Letter is closes the circuit through the apparatus of the Letter by the time one spring has passed over another Comes on in a different portion of the letter as the paper drum feeds the paper ahead a given distance Now another Machine precisely similar to this receives the message at the other End of the Line, the perforated paper being replaced with Chemically prepared paper It will be seen that if the two machines run in unison that an exact fac simile of the stencilized letters of the perforated slip will be record chemically at the other end of the Line, I propose to Construct two perfect Machines as near alike as possible, and provide each Machine with a very fine Electrical governor, and a Very convenient, delicate, and quick adjustment

for varying the speed, by the use of this contrivance and the attention of an expert to adjust instantly any differences. I hope to obtain 300 words legiably recorded every minute

The great advantage of this system of any other is that is but one machine which requires intelligence of any amount and that is the adjusting of the receiving instrument =

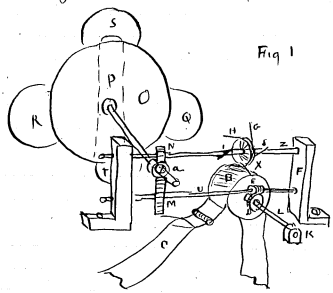


Fig 1

I will describe roughly the idea of my receiving and sending apparatus; B is the paper drum on the shaft L seamed to the bearing K D is a gear wheel E a worm on the shaft V M is a gear wheel driven by the worm a of the engine O is the fly wheel of the Engine Q R S T the magnets N is a gear wheel driven by the worm a Z the shaft carrying the wheel X with its sending or recording contact springs G H I J = C,S,S the paper; When the Engine starts the mechanism and all the parts revolve the shaft Z and springs quite rapidly and the paper carrying drum slowly, while say the spring G is passing from one end of the drum to the other and recording a portion of the letter, the paper carrying drum carries the paper ahead the $\frac{1}{64}$ of an inch so that when the spring H comes on the paper it records another portion of the letter the $\frac{1}{64}$ of an inch behind that of G And the wheel X being provided with a sufficient number of springs to record a letter at every revolution —

It may be found in practice that moving the paper feeding drum while the pens G H are crossing the paper may interfere with the record in that case the wheel D may be made and rotated step by step and adjusted so that just at the moment one pen leaves the paper, it will feed the drum ahead the $\frac{1}{64}$ of an inch before the other pen comes on the paper. The device is illustrated in fig. 2

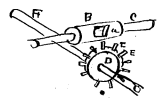


Fig 2

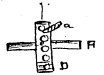


Fig 3

F is the shaft carrying the pin wheel D. provided with pins E E a is a cam on the drum B which is on the shaft C when the shaft C is rotated the cam a in passing between the pins E E cams the wheel D forward one pin Fig 3 shows the cam a just in the act of passing between one of the pins and caming the pin wheel ahead

The rotary motion of the pens might be dispensed with and the a back and forward motion made by a cam wheel on the driving shaft. in this case but one pen would be necessary. This would give a motion to the pen much easier than a rotary, for when rotated the spring bears harder on the paper when in the middle than when it comes in contact. Fig 4 will give an idea, of the devices by which I propose to accomplish the object =

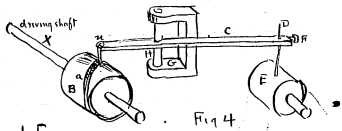


Fig 4

B is a drum with a groove planed or cut in it at an angle into which a pin n plays connected to the writing arm C. and when the driving shaft X is rotated the pin following the course of the slot gives a forward & backward motion to the shaft or rather arm C which of course impells the writing pen D. back and forth on the paper a drum E'. G is the support for the shaft H of the arm C =

The paper should be held down firmly upon the drum by a Shield thus :—

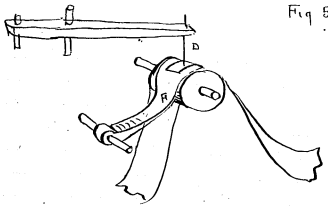
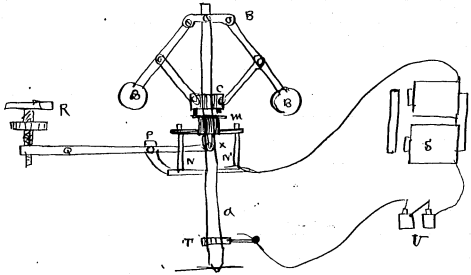


Fig 5

F is the shield, made preferably of an insulating substance,

The pen D may be provided with a small roller at its end for sending which I think will be found preferable to a flat pen, and it may be equally as good for receiving.

I propose to try several forms of Governors: fig 6 will give one



a is the shaft carrying the Governor. B B B is the governor C a collar which raises up on the shaft a as the speed increase & the balls spread out, M is another collar through which the shaft a passes but does not touch, the top part of this collar is platinized, and the bottom of the Collar C is provided with several platina points which rub on the platinized surface of the Collar M N N' are rigid rods upon which the Collar M slides up and down, Q is the adjusting rod for varying the speed, pivoted at p. and adjusted up & down by the Screw R This rod is secured to the Collar C at X. S are the Engine magnets U is the battery T is a collar upon which a spring rubs and is used as a means of connecting the battery with the shaft and its devices, It ~~will~~ is obvious that if the collar is adjusted to a certain position and the battery power is increased the speed of the Engine will be increased also, and the balls will spread out by reason of the increased speed, and lift the Collar C & its platina points off from the platinized surface on M and break the Circuit, until the speed diminishes sufficient to allow the balls to collapse when the circuit will be again closed

and so on the two collars will vibrate closely together alternately opening and closing the circuit & keeping the speed at the same rate. In practice I apprehend that the governor shown will not regulate the speed with sufficient accuracy if this is the case, a leverage can be obtained, and an extremely fine adjustment obtained by the following means

Fig 7.

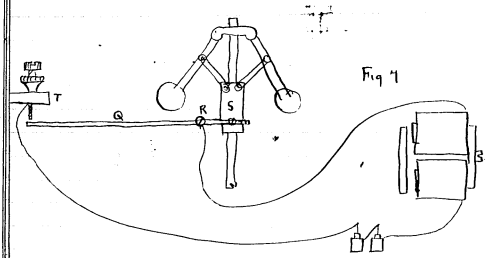


Fig 7

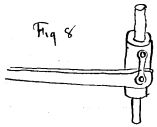


Fig 8

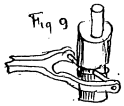


Fig 9

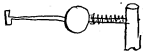


Fig 10

In fig 7 the electrical break as the speed increases is made by a lever Q secured to the Collar S by the devices shown in Figs 8 & 9 or in any usual manner This lever is pivoted at R, and the circuit is broken at T. By using this lever, and placing the fulcrum R in close proximity to the Collar S, greater leverage is obtained and the least rise of the governor balls quickly shows itself in

magnified proportions at the point T. Fig 10 shows a mode of arranging the governor balls. This governor device may be worked on a different principle, instead of breaking the Current of the Engine when it goes too fast and thereby slowing it, A magnet is arranged with a break upon the fly wheel and the governor made to break and make the circuit of this magnet and thereby put on and take off the break from the fly wheel. Fig 11 will show this arrangement

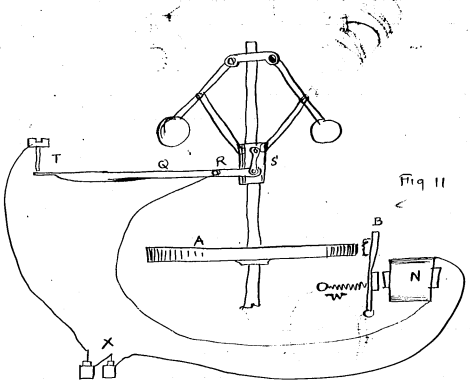


Fig 11

A is the fly wheel secured to the carrying shaft, B is a armature provided with a leather pad which when there is no circuit in the magnet N is held on the periphery of the wheel A by the spiral spring W. thus slowing it up, and the balls dropping closes the circuit at T through the magnet N, and pulls the break off from the fly wheel A, and doing this as often as the speed increases beyond the point set at T.

Instead of a worm and gear to drive the paper carrying wheel ahead the idea has occurred to me that a cam motion the same as shown in figure 4. could be used thus fig 12

Fig 12

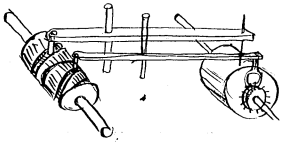


Fig 13

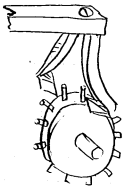


Fig 15

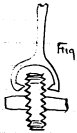


Fig 14

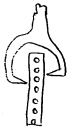


Fig 16

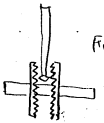


Fig 13 shows the manner of feeding the pin wheel ahead step by step — Fig 15 shows another device for feeding the paper carrying drum ahead step by step, twice for every revolution of the main driving shaft Fig 14 shows another view of fig 13

Fig 16 shows another device — Fig 17 shows another device for getting motion from the main shaft, and also for driving the paper drum

Fig 17

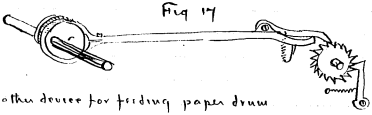


Fig 18 Is another device for feeding paper drum

Fig 18

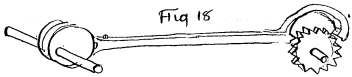


Fig 19 The same

Fig 19.

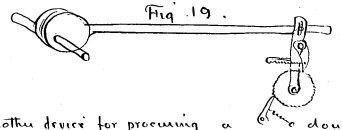


Fig 20 Another device for producing a double motion for each revolution of the driving shaft for feeding the paper drum —

Fig 20.

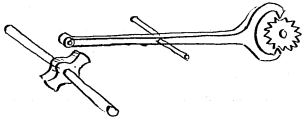
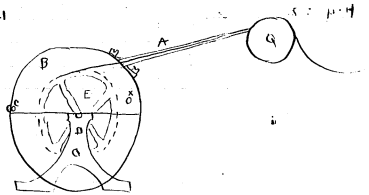


Fig 21 Represents a case for keeping the chemically prepared paper in to prevent evaporation, and to keep it wet and ready for use the moment the machine commences operation, heretofore in Chemical Telegraphs considerable trouble has been experienced in keeping the paper sufficiently damp to give a clear record, and I find that no provisions for exterminating this difficulty have been yet made to my knowledge. In my machine more than any other it is absolutely necessary that the paper should be in the machine and always ready for use, and owing to the slowness of the paper in passing

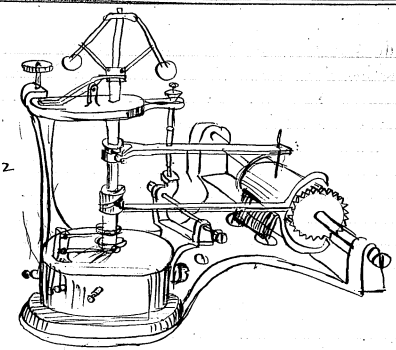
through the machine it would quickly dry in coming from a roll exposed to the air,

Fig 21



B is a metal case hinged at C provided with a handle x for opening This case is secured to the standard D. A is a long spout secured to B, and leading directly to the paper carrying & writing drum in which the paper passes E is the paper reel running within the Metal case upon Shaft the Centers of which run in the standard D. The rest of paper which has previously been prepared is set within the Case B and the end led through the spout A. and then closed, and being almost or air tight the paper will Keep moist and ready for use for weeks. It will be noticed that no part of the paper is exposed to the air until it reaches the paper Carrying drum ready to be used =

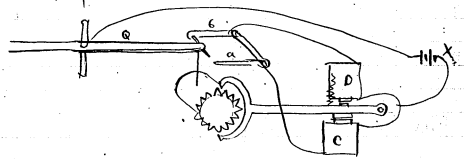
Fig 22



Proposed form for Constructing the Machine = Fig 22

In practice it may be found necessary to feed the paper drum by a seperate magnet, which will take an Intermittent work off from the Engine (or) perhaps add to the accuracy off the Unison of the two machine It may be done in this manner. Fig 23

Fig 23



a and b are contact points. each connected with the magnets C. D. the Connections arranged in the usual manner - When the writing pens comes over to one side it makes contact with one spring closes one magnet which feeds the paper ahead one Teeth (or) going backs throws the current from the battery X through the other magnet and closes

thus feeds the paper ahead another tooth =
One magnet could be dispensed with Q a spring used in its place

It also may be found necessary to make the writing pen travel straight across the paper and not perform an arc as I have heretofore shown Thus Fig 24

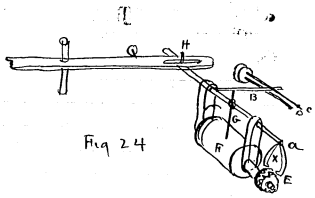


Fig 24

Q is the lever a a sliding bar carrying the pen C and prevented from tipping by the wire B and guides C O.
H is connected to Q by the pin H and slot
E is the paper feeding ratchet = Q and a might be connected by a link which would reduce the friction, The rotatel wheel E might be a double Crown wheel with V shaped teeth or a pin wheel and an a fork X made to feed the paper by the back & forward movement of the writing shaft a.

From Page 3 to Page 14 Written, and illustrated on the 29 & 30th of July (1871)

Witness Jos. F. Murray J A. Edison

In this system I intend to use an automatic letter puncher in my preface I mentioned that I intended to use and punch the letters in the paper upon the stencil principle, that is. The letter after being punched would resemble a stencil letter, the intersticies of the letters being held together by strips from outside of the paper = Thus, = ~~upon experimo~~

BON Fig 25

upon experimenting with this and several other previously Conceived ideas, I found that the inside of the letters or parts left after the letter was cut was very fraible or weak and that the transmitting stylus or other device would be liable to break them out in passing over them and thus destroy the legiability of the letter at the other End of the line = The best form for punching or preparing the letters I found was to form them of a large number of small holes. Thus :—

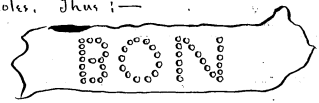


Fig 26

When the letter is punched in this manner no part of the paper left within a letter after punching is materially weakened, at least not weak enough to produce inconvenience in transmitting the same,
I also find that by adopting this mode and way of making a letter, the Mechanical difficulties which would be encountered in preparing messages by a stencil letter would, be greatly reduced by making the letter in the manner last described, Another advantage in using the perforated letter composed of Samall holes. is that the received copy at the other End of the Line is much more legiable, and has a more handsome appearance

The copy of received from a stencil letter would resemble the following

BON

Fig 27

While that received from the letter composed of round holes would be thus ...

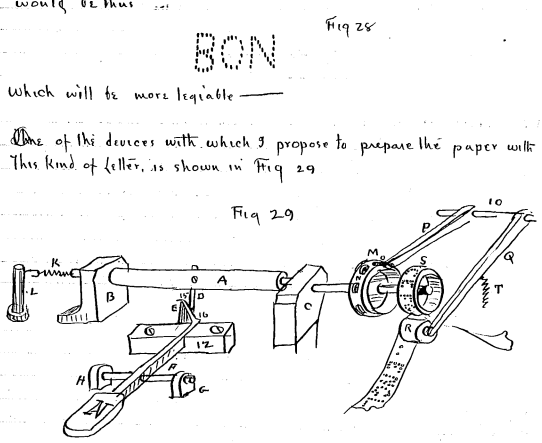
BON

Fig 28

which will be more legiable ——

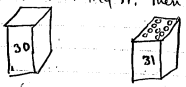
One of the devices with which I propose to prepare the paper with this kind of letter, is shown in Fig 29

Fig 29

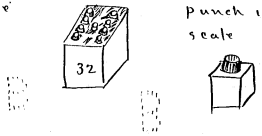


S is a Hollow Drum in which is fitted 28. letters formed of holes. The manner of making each letter I will briefly explain before I give a description of the Machine

A block Fig 30. of steel is drilled from end to end with holes to form the letter thus Fig 31. Then the metal around these



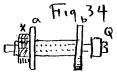
holes is filed or cut away so as to leave the edge of the hole sharp enough to cut a hole in the paper when pressed on it. Fig 32 will show this, and Fig 33 will show one single punch in this manner on a magnified scale



These block each containing a letter of the alphabet is set in the periphery of the wheel S. and secured firmly to it

R is the roller which carries the paper and upon which the letter is cut out, This roller is formed in a peculiar manner, to withstand the constant wear of the cutting punches on it after passing through the paper. Fig 34 will show the metallic portion of the roller

Fig 34



The flanges a b of this roller is filled with washes of raw hide, or cat gut, or with paper and then subjected to an immense pressure and held together by the nut x. Then turned of smoothly in a lathe. These two substances when arranged in this manner have a "peculiarity" which no other discovered substance has, or is known to have. That is that the cutting edges of punches or knifes or sharp tools do not wear them at all and they will stand for months of continuous cutting. and still preserve their specific peculiarity or quatity Now it will be seen by referring to fig 29. that when a letter with its cutting edges is brought directly under the roller R and the Lever Q lifted upwards with sufficient force. the cutting edges of the punches will cut through the paper on to the raw hide roller R and punch a letter —

The manner in which I bring around any desired letter & have the lever Q raise the drum R upwards to the face of the drum S. I will not explain:—

B & C are frames in which the shaft A run, upon which shaft is two wheels S and M. the latter having teeth upon one side of its periphery. on the other side is a pin o rubbing continuously upon said periphery. This pin is connected rigidly to the lever P which is connected rigidly with the lever Q by means of the shaft 10. so that when the lever P is raised it raises the Lever Q and drum R with it T is a spring to keep the pin o down upon the periphery of the wheel M where there are no teeth. The shaft A slides endwise. but is prevented from doing so when not operated, by the Spring K secured to the shaft and standard L

The manner of arresting the rotation of the shaft and throwing it forward of endwise is quite simple

N is the finger key pivoted on the shaft F, which runs in the bearings H and G and the end of the key N is bent in the manner shown in the drawing. so that when the key is depressed the cam or bent end E is thrown into the path of the pin D on the revolving shaft A. the pin D first strikes the bent end at 15 and the shaft continuing to rotate, the it is cammed forward or endwise and then suddenly arrested by the straight part of the key at 16 The moment that the shaft is moved endwise ~~that pin O~~ on the lever P ~~is thrown~~ further that portion of the periphery on the wheel M which has the teeth is thrown into the path of the pin O on the lever P which riding upward on one of the teeth lifts the lever Q and drum R and paper up to the letter which corresponds to the arm D upon the wheel S. with sufficient force to cut it out Now the moment the Key N is allowed to be released, the spring K pulls the shaft back and throwing the teeth on the wheel M out of the path of the pin O. and the shaft commences to revolve again, before this is done the pin O would have passed over a tooth on the wheel M and effected ~~throw~~ cutting out of the letter a

dropped down out of the way before the shaft was released. The shaft A could be provided with 28 or 30 pins set in different positions upon the shaft and directly in the path of as many keys similar to N. so that by depressed any key a certain character upon the die wheel S could be brought in the desired position, In practice it may be found necessary to dispense with the teeth ~~and~~ on the wheel M and substitute in their place undulatory "faces" as shown in Fig 35 This would be a positive movement and prevent any momentum being given to the levers P & Q by the suddenness with which the teeth strikes the pin O.

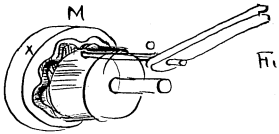
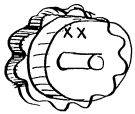
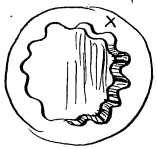


Fig 35

Fig 36.



37



When the Wheel M is thrown forward the pin O enters the undulatory cams at its lowest point and rides up and down one undulation ~~when~~ which lifting the Levers P & Q and punching the letter is thrown out of these slots by the wheel M moving back and then the pin O rides upon the smooth portion of the periphery

Fig 36 & 37 shows how these slots are made XX being fitted inside of X and both secured together and with the ~~sh~~ shaft = The manner in which I propose to move the paper, I will

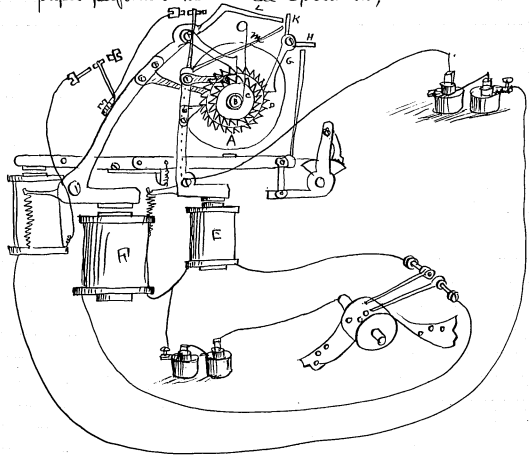
now describe

Date of written between July 31 and Aug 4 1871

Witness — for T Murray T A. Edison

A new system of Telegraphy, using neither dots nor dashes, but receiving the message by a Puncher or Embosser and Running it through an automatic Translating Printing Machine I do not wish to confine myself to any particular Translating Printing Machine, as I have innumerable machines in my Mind now which I shall continue to Illustrate & describe day by day when I have the spare time,

The Printer which I propose to use for translating from the punched or embossed paper, is as follows though I may improve it in time or adopt an entirely new one using Magnetism or dispensing with it and make the paper perform a mechanical operation,

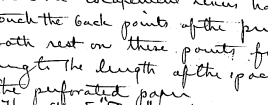


A is the type wheel B its shaft C is a small rotatial wheel rotated by E Magnet armature lever pawl & detent, and D another rotatial wheel rotated by the magnet F Armature lever check & detent, the first magnet E pushing the type wheel ahead one letter

and the magnet F. 4 Letters, G is a pawl for preventing the type wheel from returning to Zero which it would do by the action of the rubber cord M secured to its shaft, The Printing Throw this detent out of the path of the rotatel when it takes an impression When this takes place the type wheel returns to Zero, This click is placed back in its original position by the first forward Movement of rotter rotatel Lever operated by the Magnet.

The Printing Lever is jointed near to fulcrum and held to the other part of the lever by a tension, and when the magnet attracts this Lever the forward part goes further by its momentum than it would if the Lever was actuated slowly and in so doing effects the impression and immediately springs back out of the way of the type wheel, and at the same moment when the lever has reached its extreme Limit, the click G is thrown out of the rotatel and the Cord M pulls the type wheel back to zero The circuit of the type wheel rotating Magnets ~~and~~ is opened a closed by perforated or Embossed paper. The characters being in two rows, one row rotating F The type wheel 4 Letters at a time and the other but one Letter at a time, the 4 Letter Magnet & devices might be dispensed with but the characters of the perforated paper would be too Lengthy, The Printing Magnet is closing when the both Escapement levers have ceased to work and touch the back points of the pinning Cranks They both rest on three points for an interval according to the length of the space between the Letter on the perforated paper

To translate The Word "This" The perforated characters should be Letters = The holes in Line No 1 rotate the type wheel 4 Letters for Each one and as T is the



20th Letter 5 dots are used when the space between the

Letter Comes this gives the Escapement Lever time enough to close both points & close the pinning Lever & effect the pitch of that Letter,

The Letter H being the 8th Letter but 2 holes are necessary the Letter I being the 9th Letter in the Alphabet 2 holes in Line No 1 turn the the type wheel to the 8th Character & one hole in Line No 2 one more Letter bringing it to I. S being the 15th Letter 4 in the upper Line bring it to 12th Character & 3 in the Lower to the 15th which is S', 3 rows of holes Could be used but it would be hard to transmit them over the wire,

The Device for Running the perforated Embossed or otherwise prepared paper through may be a Drum Carried by Magnetism Weight Spring & any other free or free-stopping device,

There are several ways by which this translating paper may be prepared by an instrument operated by similar paper at a distant station.

first 1st = An Electro Magnet may have a very delicate Valve fitted to its armature Lever and this Valve operated a cylinder & piston worked by Compressed air or other force or power, and the piston of which has a punch Like a belt punch, Cutting upon a block of Leather, Rawhide or Compressed paper ~~and~~ at every hole punched feed the paper ahead, or the punching may be done while the paper is being fed Continuously by other means, The Magnet should be a polarized one working two valves & pistons one Cylinder & piston punching or Embossing holes in one Line & other other

piston in another line, which line being determined by the polarity of the current, the paper might be dispensed, the lever of an ordinary morse Register being operated by the cylinder & compressed air or Chemical paper might be used, the decomposed portion being of such a character that by immersing it in another substance an action would take place to form a salt or other matter & so raise the character in relief - which could be made to raised a very delicately poised lever & open & close the electric circuit = of the translating Printing Machine or an Ink Recorder could be used the ink of which would be a conductor and two points closely together & connected with either end of a battery & magnet the mark would also connect the two points together or the ink could be a Chemical & dipped in some solution like that which I proposed to dip the Chemical paper,

Above written Aug 31 1871

T A. Edison

Witness, Jos T Murray

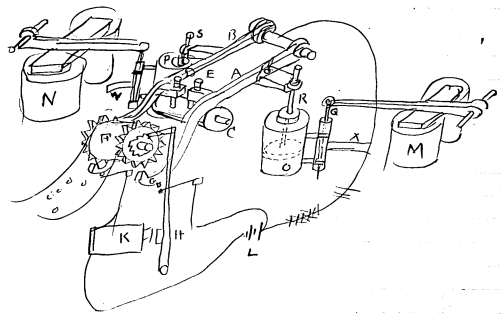
Or the ink of the ink recorder could be mixed with a sticky or gummy substance and just at the moment the recorded characters were made by the Roller a fine spray of hard substance could be thrown upon it it adhering to the ink and raising it in relief, Sand, flour Emery, Pumice Stone, Sugar, or some hard substance of a porous nature, having an absorbent power & ground fine could be used, or the ink might contain an acid or chemical substance which would burn eat or rot holes in the paper,

or a lead pencil might be used instead of the ink roller and the plumbago mark would be made to close an circuit having a very high resistance

Battery in it, or the end of the magnet lever might have a fine needle and prick holes in the paper and the burr which would be thrown up on the other side be made to close a circuit by means of lifting a delicately poised lever,

or a sharp groove might be cut in the paper carrying drum ~~and~~ in which the roller having a sharp edge would just fit, and tissue or other thin paper being used when the roller came down it would enter the groove and show the paper

I will now explain my Compressed air receiver

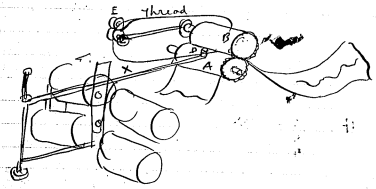


A & B are the levers having ordinary belt punches putting on a raw hide surface or roller C

S & E are the punches, F is the paper feed drum have two V shaped ratchet wheels the end of levers A & B having wedges which throw the paper forward after it is punched

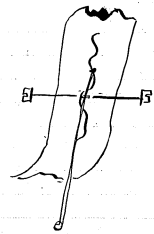
K is a magnet having a lever H which is provided with a pawl working a ratchet on the paper feed drum F, thus ~~as~~ to

feed the paper ahead between the two Letters
The two levers A & B being provided with closing
points so that when both levers are at rest the
close the Circuit through this Extra Magnet,
But when operating they do not stop at the Contact
point long Enough to allow the Magnet to act
owing to the tremendous rapidity with which
the levers act, O P are the air cylinders the Valve
being operated by the main Line Magnets, one
Magnet responding to Negative Currents and the
other to positive Currents,
I do not wish to Confine myself to any particular
form of Air Cylinder or Valve, I merely claim
Punching paper or Embossing paper by
Compressed air controlled by Magnetism,
also positive & negative Currents for doing same
thing, I have been experimenting this day upon
a novel idea by which the paper may be Embossed
at a tremendous rapidity & requiring very little
power to Control it,
I do it by means of and Endless Chord,



A & B are two rollers rotated by power and closely held
together by immoveable bearing ~~and~~ & Carried
around by gear wheels, One Roller is very hard

substance and the other soft, The paper passes between these
rollers, and with it a Hard thread, or watch chain, This
thread or chain in passing through these rollers
with the paper of Course the thread or chain is impressed
to full depth in the paper, and leaves an endless
embossed or raised mark upon the paper, This
Chain or thread is Endless band like, and the
Thread passes through a little hole on a head
at the extreme end of the armature lever X at
D, E is a guide roller for guiding the chain
and worked by gears or other device, from the
roller A. B. so that the thread or chain will always
be stuck where it passes through the point on the
magnet lever, The Characters are formed by
guiding the thread either one side or the other
When a loop either one side or the other is
thus made the rollers seize the thread and
immediately indent this loop in the paper, This
paper after being prepared has a follower with
a point the point running in the groove
and of Course giving a back & forward motion
to the lever which closes a circuit Each time
it passes to the right and clog another in passing to
the left, Thus



Though this may be done in many other ways
The Characters being made to lift a lever
or two levers & closing the circuit that way

This chain band or thread might be wound around the roller itself and a slight slack made, to allow of making characters the thread guided by a fork from the armature lever of the Electro or polarized Magnet,
or the roller could have two flanges at its end higher than itself and innumerable little wires passing from End to End around the cylinder so free to move endwise these little wires could have teeth on them two teeth on each end when in their normal position these teeth would form two continuous wheels but if the armature lever should throw one of the little bars forward the of the teeth would indent out of line & thus form a character, A Cam on the other side of the roller would throw the rod back in position after the impression was taken

Sept 4. 1871

7A Edison

Witness Jos. F. Murray

The ink used in the Ink Recorder, or any recorder which I may adopt could be of a gummy nature, and as quick as The Record should have been made it could be quickly Covered with gold leaf or ultra alemunlid metal or very fine metallic dust could be mixed with the ink or thrown on after the record was made - Instead of the Thread or chain for embossing after the manner described Sept 4 1871, The armature Lever might be a tube ~~within~~ and placed at an angle and Continuously fed with very fine Shot or round, or small substances these could be near the two rollers a stopper, and the End of The tube when in its normal position would rest against this & thus prevent the shot from Rolling down the tube, if now the armature Tube is deflected to the right the shot run out are Caught between the two rollers & the paper and they are indented in the

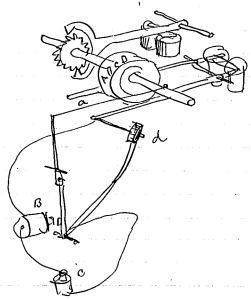
paper, and when deflected to the left the shot roll between the rollers in another line, These indentations Can be made to close & open an electric circuit in Connection with the printer, the mechanism Which rotated the Indenting Rollers ~~etc~~ also Carries the shot back to ~~f~~ Be fed through again,

At the present writing I am inclined to believe that I am the originator of the idea of using perforated paper for controlling or working printing Telegraphs

Sept 15

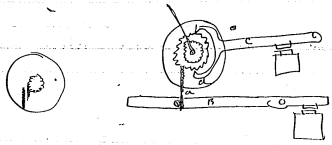
Witness, Jos. F. Murray Thomas A. Edison

On page 24 I describe a printing Machine by which the type wheel returns to zero Every time a letter is printed, I will now describe Second way in which it Can be done,

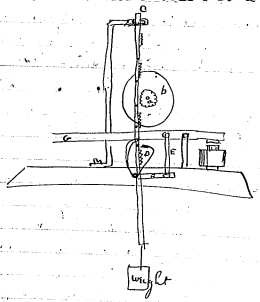


B a magnet a a Cord d wires break When the type wheel has been rotated to proper position the printing Lever Come

up effect the printing & as the Amount in the relay & the Relay lever goes forward tightens up the Cords and pulls the Wheel & shaft back to zero again!



a a rack B printing Lever C Escapement lever d type wheel when printing Lever goes up rack goes into teeth Cut in shaft and throws it back to zero which is a limiting pin.



G the printing lever b the type wheel a the shaft with teeth Cut in it C an intermittent rack pulled downward by a weight and released by the printing lever moving the pallets S by and of bar F and link E thus pallet

release pins on side of C. The action of this mechanism is easily seen.

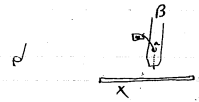
Janey 30 1872.

Thomas A. Edison

Witnessed

Jos. F. Maurey

Hollow Cutting Punch Manner of getting rid of the Chips thus



B the punch X a rawhide pad on which the Cutting punch B cuts a a small hole through which a wire (small) runs this wire being stationary. When the Punch moves down and Cut a piece ~~it~~ from the paper this pad in the punch which in Coming up the wire punches or shoves it out. =

I have another device by which the punch or Cutter when it Comes on the paper presses hard and turns around thus Cutting it out after the manner of a Knife =

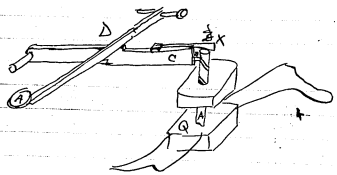
Mrs Mary Edison My wife Dearly Beloved

Cannot invent worth a Damn! !

Feby 1 1872 T A Edison

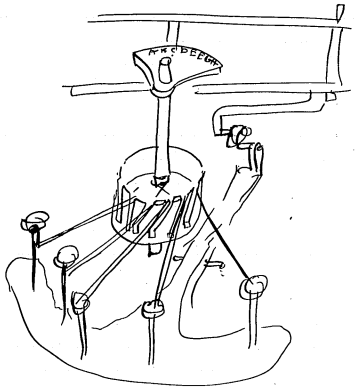
Perforating Apparatus:

The mention consists of a set of cutting wires or punches which press on the paper and turn around at the same time by the action of the levers worked by the keys and a steady pressure kept up by a spring on the key bar thus



D the key C the punch lever or key bar A the cutting punch which has a spiral groove cut in it like a twist drill into which groove a tit from the key bar C runs X is a spring When the key is depressed the key bar C is depressed the spring X letting the top of the punch A bring it down on the platen of raw hide Q & on the paper and the downward motion of the bar C and the tit rotates the cutting punch A and cuts a round hole in the paper after the manner of a knife or hole y shear I have only shown one punch, hem and punch of the nine The spiral groove in the punch A might end near the top and a spring attached to the punch

A to pull it down on the paper when the lever C is depressed but the tit on this bar would lift the punch up off of the paper when at its normal position as the spring on the bar C would be much stronger than that on A.



Printing Machine X Crown ~~and~~ wheel with Cam slots depress a key rows type wheel around in right place Lever hits platen four points, described to Ringer

Feby 2 1872 J A Edison

Nov 12 1874 Experiments with Weiss Galvanometer

Ferrocyanide of Pot when bent or rubed wet or dry on surface gives no current

Pure stick zinc when bent or rubed gives no current

Peroxide of Manganies crystals gives A very sensible current

Peroxide of Manganies crystals connected to copper and Platine electrode very sensible current when held in hand but not when cold seems to show thermo electrick properties

With tin electrode about the same

Nickle very strong

Steel " weak

copper electrode gives a reflection

Aluminum " " " "

cadmium " " " "

could discern no ~~electricity~~ current by rubing two pieces of cadmium together

cadmium and steel electrodes in bottle of black oxid

Manganies dry gave a reflection equal to one

cadmium and Platine ½

" " Tin ½

" " Nickle ¼

" " copper one the other way

" " Aluminium ¼ " "

" " Pure zinc 0

Antimonic acid when rubed or bent gives no current

feebledly dry bump

But placed between copper and platine electrode gives a strong current, tin and copper a current one other way Nickle and copper a current

cant detect no current from the bending of hardrubber

Chas Batchelor

Tellurium.

July 27th 1874

Protochloride of Tin precipitates metallic Tellurium in a finely divided state as a black powder.

Hydrosulphuric acid of Ammonia precipitates Tellurium in black powder as a sulphide

Batchelor

Sep. 9th 1874

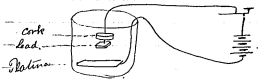
Pyrogallic Solution

for what purpose	Water	Pyrogal.	Salt
for a number of thicknesses of paper	20 ℥	11 grains	2 oz.

Scales. E-1677 -
p.128 telegram from Edison. Sept. 3.
Meff for Gomestic Tele.
M.C.B.

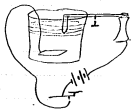
Experimental Philosophy.

1. Aug. 3 1874.



See if H evolved on the Lead will decrease its specific gravity
Solution Caustic Potash.

2.



See if it dies when circuit is open.

Bat will be in action
Bat in action

1. 12 cups of battery used. Bunsen.
Cork raises slowly but is entirely due to mechanical means so much H collecting under the lead as to considerably lessen its weight. Acts slow. Satchelor. Aug 3 1874

Satchelor
20 lb
different exp.

August 4 1874

Aniline, Water, ~~Nitrate~~ Mercury Nitrate
Iron pen smooth on Oxygen, Thallium best.
But without Aniline Mercury Nitrate alone gives
black or brown mark with Iron pen —
Added Nitrate Soda or Potash to increase
Conductivity — Chloride precip Mercury
White paper
With Aniline Carmine shaken with Chl
Sodium & Fuming Nitric Acid, Iron
pen gives a pale carmine color on O,
becomes deeper after exposure. It has
a bronzing appearance in Mercury
— Yellow paper

Cadmium 8 W

4 Cells Metals used P 7a Nickel Cu Sn Pb Brass

Herbal Extract

Dwarf Elder

Oxygen Hydrogen

Nacl. Carbon Zinc

all-

Dwarf Elder ~~carbon~~ zinc with platina very pale yellow mark, very inferior, not sensitive. —

do with Nitric A — nothing.

Henbane. Platina or Zinc yellow pale inferior quite, but better than Elder. Iron or Carbon inferior.

Garden Nightshade.

Nothing on any

Comfrey Root

Nothing on any

Solomon - Seal Root

Nothing on any

French Thyme

Fair but inferior yellow mark with Platina or Z comes out better after while might do for short account.

Chickweed

Nothing on any

Plantain Leaf, X

Nothing on any

Turkey Corn Pea

Nothing on any

Celery Root

Nothing on any.

Thunderweed

Nothing on any

Motherwort

Nothing on any

Bogenbitter Lice - Platina to zinc pale yellow - inferior - Iron to Zinc inferior - Carbon nothing.

Sweet Elecampane

Nothing from any

Wild Cherrie

Nothing from any

Dandelion Herb

Nothing from any

Meadow Sage

Nothing on any

Pearberry Leaf

Nothing on any

Wild Carrot Flowers

Nothing on any

Asparagus Root

Nothing on any

Rough Scrap Chaves - Platina on zinc very pale yellow - very inferior - Carbon nothing

Rosewood Flowers Platina to Zinc - Low yellow

Princess Pin Platina to Zinc - very Low yellow

Garden Balm

Nothing on any

Hemlock Bark

Nothing on any

White Pond Lily Root

Nothing on any

English Smart Weed - Copper to Zinc - very poor yellow.
Pink leaf Pyrola Platina to Zinc very poor yellow.
Wormwood
Nothing on any.
Fair Cat Moss
Nothing on any
Arnica Radical leaves
Nothing on any
Cocash Herb Steel to Carbon - very black mark - Zinc nothing - Steel mark indistinct at first - but gradually becomes distinct -
Dandelion Root
Nothing on any.
Heal all
Nothing on any -
Young Cedar
Nothing on any.
Raspberry Leaf
Nothing on any
Wild Lettuce Steel to Zinc very poor dark mark.
Red Maple Bark Steel to Carbon - black mark - faint at first - black after - very poor.
Red alder Bark Platina to Zinc - at first a faint mark which gradually becomes a kind of a bright "hard maroon" Iron to Carbon very poor black
Ailanthus
Nothing on any -
Yarrow Platina to Zinc faint yellow
Steel to Carbon pale black
Gentian Root Steel to Carbon very faint black mark

Balmony - Platina to Zinc very faint yellow mark. Steel dito.
Rattle Snake Plantain
Nothing on any.
Pussy Willow Buds
Nothing on any
False Bitter Root Bark
Nothing on any.
Marygold Flowers
Nothing on any
Sweet Flag Root
Nothing on any.
Sarsparil
Nothing on any.
Nettle Root
Nothing on any
Maiden Hair Fern Platina to Zinc very slight yellow - Steel to Carbon poor black mark
White Pine Bark
Nothing on any
Nerbeers Blue
Nothing on any.
Cotton Buds
Nothing on any
Mayweed
Platina Zinc poor faint yellow
Cedar Berries
Nothing on any
Oak Leaves
Nothing on any
Burdock
Nothing on any
Blue Cardiac Flowers
Nothing on any
Catnep Platina vs Steel to Zinc both give very slight & poor yellow marks

Wild Indigo Root
Nothing on any
Parsley Root
Nothing on any
Rue Herb Platina & Zinc - slight opaque yellow - Steel & Carbon inferior
Dock Root
Prickly Ash Bark
Nothing on any
Sumac Bark Root
Nothing on any
Poke Root Platina & Zinc Opaque
"Sticky" yellow
Mare foot clover Platina & Zinc fair yellow
Club Moss Nothing on any.
Apple Mint. Steel & Carbon. poor black
Mark - Platina & Steel & Zinc faint yellow
Sunflower Seed
Nothing on any.
Foxglove Brown & Zinc, Sticky yellow

Aloe antm. Nacl mix on P.
" Nacl NO_3 mix on P

Chl Mang P. on O fair
" Nacl. bottle

Cadmium Chl (phyrogal)
P. on O. light yellow not very good.

Juniper Berry
Nothing on P.

Frostwort.
very faint yellow P on Zinc

Sweet fern
quite sensitive yellow P on H
pyro improves it to same
added Brazil W. very nice

Gall of the Earth
nothing

Sweet Bugle
Mullein Root Slight yellow P on H
Slight yellow P on H

Chestnut bark
slight drank
P on H,

Life root.
Nacl VERY SENSITIVE P on H
pyrog dont improve but marks very pale yellow

Brazil W & nit am. red mark spreads painfully (acrid) not a kills it Enlarge dont mark

Arnica Root P on H
Nacl Pale yellow but sensitive

Trad flux no good
Soap root mix
Cornell grass mix
Water Hemlock mix
Beach bark
made 1/2 fair P or H
Ozm good, its
the Tannin in it

Red clover head
Very Seas - but extremely
pale yellow

Chestnut leaves,
Very pair - almost good
P or H but its the
Tannin

Brat many no good
In Chl Calcium Ha Cl - unsalizable
Chl Lithium no good
Valerianate Zinc no good
Chl Strontia something in it
Very good made

Nitrate of Prot Mercury. Nitric acid
neutralized with Ammonium Hydrat
or Potassic Hydrat. Then add
Rosanilin. Then Salt, filter. Use
Sensitive. Tropen —

Nitrate prot mercury.

Continued

also Chl Cadmium
something in it good
made =

Rhodant Ammonia
good - try it more

Edison
Patchett
Adams
Fox
Long
Charley } 12

Edison.

Chemical Experiments Lora. Sensitive & permanent solution March 8th 70

Metals Used. Iron. Indium: Bismuth - Magnesium. Cadmium. Cromium. Aluminum Antimony. Palladium. Zinc. Tin. Lead. Copper Ruthenium. Lithium. Thallium. Arsenic. Nickle. Platina. Molybdrum. Osmium. Uranium. Rhodium Silicum. Zirconium - Manganese. Silicium. Vanadium. Coed. Bismuth. Scale of battery used Sact - Edison.

Nitrate Magnesia - Nothing on Zinc Carbon - ~~Platina~~ a slight black mark Platina on Zinc Carbon - a yellow mark with Ruthenium on Zinc - try again Indium Manganese on Zinc - not very sensitive black mark - a light yellow with Palladium on Zinc.

Nitrate Magnesia - Sact Batch

Nitrate Ammonia & Nit Magnesia - nothing on Carbon blackish mark on Indium on Zinc.

Sact & Nitrate Magnesia Batch - Manganese Prussian bright red mark on C - try again Edison. Nitrate Amonia & Nit Magnesia. Ruthenium on Zinc - quite sensitive. Try again.

Nitric Acid & Nit Magnesia on Carbon. Nothing. Zinc. ditto. Indium black mark fades - no good.

Nitrate Amonia & Nit Magnesia - Carbon - Batch Sensi - Faint black mark. good.

Sact & Oxalate of Strontia Carbon. Edison - nothing nothing on Zinc

Nitrate of Amonia & Oxalate Strontia. Carbon - Edison - Nothing - Zinc Ruthenium. try again. Indium not very sensitive try again.

Nitric Acid - Oxalate Strontia Carbon - nothing. Zinc Nothing

Acetate of Lime - Sact - Carbon. Edison - six - Zinc nothing - ditto Nitrate Amonia - Carbon Nothing - Zinc Indium fair - black mark

Batch

Nit Amonia & Nit Magnesia Carbon - Batch Manganese Bright Red mark try again.

Nitric Acid & Nit Magnesia Carbon. Osmium black mark fades out - ditto Manganese very bright red mark try again. ditto. Bismuth black mark

Oxalate Stronta & Nitric Acid - Carbon Manganese - bright red mark try again - ditto Carbon - Sensi - faint black mark.

Acetate of Lime - Nitrate Amonia Carbon - Manganese bright Red mark try again.

Batch Over

Acetate of Lime & Nitric Acid. Carbon. Rosting.
Ditto Zinc - Indium Slight fader.

— " —

Acetate of Baryta & Met. Carbon. rosting - Zinc nix -

— " —

Ditto & Nitrate Ammonia - Carbon rosting - Zinc Indium fair - try again. Palladium fair try again

— " —

Ditto & Nitric Acid. Carbon Rosting - Zinc Palladium marks slightly. Ruthenium Slightly

— " —

Manganate of Potash & Met Carbon. rosting - Zinc Ruthenium Slightly

Ditto & Nit Amonia - Carbon nix - Zinc - Indium & Ruthenium Slight.

Ditto & Nitric Acid. Carbon rosting - Zinc Ruthenium Slightly

Ditto & Nit Amonia.

Sulphite of Soda & Met Carbon nix. Zinc Ruthenium & Palladium - Paly fair -

Ditto & Nitrate Amonia Carbon nix - Zinc Ruthenium & Palladium slightly

Ditto Nitric Acid. Carbon nix - Zinc Cobaet mark very insensitive

Bisulphite of Soda & Met Carbon rosting Zinc Palladium Slight.

Ditto & Nit Amonia Carbon rosting. Zinc Ruthenium & Palladium Slight.

Ditto & Nitric Acid - Carbon - nix. Zinc, nix -

— " —

Sulphate Stronta & Salt - Carbon Zinc Ruthenium & Palladium very slight - fader

Ditto & Nit Amonia Carbon nix - Zinc Ruthenium & Palladium Slight

Ditto & Nitric Acid. Carbon - nix - Zinc Ruthenium & Palladium very Slight =

Oxalate Stronta & Met. Rosting on Carbon, or Zinc

— " —

Acetate of Lime & Met Carbon. Manganese bright red mark. Zinc rosting

Ditto & Citric Acid - Carbon - Manganese bright red mark try again. — " — Zinc - rosting.

Acetate of Baryta & Nitrate Amonia - Carbon Manganese bright red mark - ditto - Silver dull black mark

Ditto - & Met. Carbon Manganese bright red mark - Zinc Rosting.

Ditto & Nitric Acid - Carbon. Manganese bright red mark - Zinc rosting - also Silver dull black mark on Carbon - fader out. —

Manganate of Potash & Nit amonia. Carbon - Silver - black mark. Manganese red mark - Zinc nix — " —

Ditto & Nitric Acid. Zinc - Zirconium - black mark but fader instantly - Carbon - Manganese bright Red. Silver - black mark — " —

Sulphite of Soda & Met. - Carbon & Zinc - nix

Ditto - Nitrate Amonia - Carbon & Zinc nix

Ditto & Nitric Acid. Zinc nix. Carbon. Manganese bright red. — " —

Bisulphite of Soda & Met. Carbon & Zinc - nix.

Ditto & Nit Amonia Zinc. Zirconium black mark - try again. Manganese on Carbon - red mark very poor

Ditto & Nitric Acid. Carbon - Manganese bright red mark - Zinc nix

Sulphate of Stronta & Met. Carbon. Manganese bright red marks. Zinc rosting

Ditto & Nitrate Amonia - Carbon - Manganese very bright red mark. Silver - black mark - Zinc Rosting.

Ditto & Nitric Acid. Carbon Manganese bright red mark - Zinc rosting

Edison

Protochloride of Tin & Sact. - Carbon & Zinc mix -
Ditto & Nit Amonia " " " nothing of
any Consequence.
Ditto & Nitric Acid. Carbon mix. Zinc Indium
Midding - fade out.
Sulphate of Zinc & Sact. Carbon mix. Zinc nothing
of any Consequence
Ditto & Nit Amonia. Carbon mix. Zinc nothing
of Consequence
Ditto & Nitric Acid. Carbon mix. Zinc nothing
of Consequence. — " —
Pyrogallic Acid & Sact. Carbon Platina Slight.
Iron Slight. Indium Slight. Litium marks without
a comment. Zinc nothing of consequence
Ditto & Nit Amonia - Zinc & Carbon - nothing of
Consequence
Ditto & Nitric Acid. Carbon - mix. Zinc Ruthenium
& Palladium are to best yet. Try again.
— " —
Valeriante of Zinc & Sact - Carbon & Zinc mix -
" " " & Nit Amonia. Carbon & Zinc mix
" " " & Nit Acid. " " " "
Nitrate of Allagania & Sact. Carbon - mix - Zinc mix -
" " " & Nit Amonia - Carbon mix - Zinc Ruthenium
Slight.
Ditto & Nitric Acid. Carbon mix. Ruthenium & Palladium faint Zinc
— " —
Hypochloride of Lime & Sact. Carbon mix. Zinc Cobaut
Bully - red hot - black. black permanent try
again.
Ditto & Nit Amonia, Carbon mix - Zinc cobaut
dont mark.
Ditto & Nitric Acid. Carbon mix. Zinc, Indium fair
but fade.
Acetate of Copper & Sact Carbon & Zinc mix
" " " & Nit Amonia " Carbon - nothing of
Consequence - Litium marks without Carbon.

Batchelor

Protochloride of Tin & Sact. Carbon & Zinc mix
" " " & Nit Amonia. Carbon - phenomenon
Silver - brown mark. ~~Cant make more than a~~
~~mark if you draw too slow.~~ best seen on
Silver so far.
Ditto & Nitric Acid. Carbon Manganese Red
mark. Good on Carbon. medio b - mark. Silver
on Carbon good. Zinc mix.
— " —
Sulphate of Zinc & Sact. Carbon. Manganese
bright red mark. Zinc mix.
Ditto & Nit Amonia. Carbon. Silver black mark.
Manganese bright red mark. Osmium black
mark when worked very slow Zinc mix.
Ditto & Nitric Acid. Carbon. Manganese bright red mark.
— " —
Pyrogallic Acid & Sact. Zinc, Molybdenum brown
mark. Osmium brown mark - ~~try again~~ Lithium
brown mark. Manganese brown mark. Lithium
brown mark. Vanadium brown mark. Good brown
mark. Silver ditto. Carbon. mix
Ditto & Nit Amonia -

FOR EXPERIMENT

Phenomenon.
Pyrogallic Acid & Citrate Amonia. Marks
black with Silver - doesnt appear at
first - after an instant dense black.
Silver & Carbon. If the Silver is first
Conquered & Zinc no mark is made
but if it is then put to Carbon & soon
one has mark it makes an instantaneous
curly black mark. Extraordinarily
Sensitive. Nitric Acid & Pyro. Sact
& Pyro. do not produce the ~~phenomenon~~
with Sact it marks on Zinc in the
usual way. with mixture of Sact & Nit
Amonia marks on both Zinc & Carbon

Edison

Citrate of Potash & Sact - Carbon & Zinc mix
" " " & Nit Amonia - Carbon mix. Zinc
Indium quite sensitive & permanent.

—"—

Lactate of Zinc & Sact Carbon & Zinc mix -
" " " & Nit Amonia. nothing of consequence on Elec.

—"—

Nitrate Magnesia
Oxalate Amonia & Sact. H2O. Nothing
Ditto & Nitrate Amonia H2O mix
" Nitric Acid. H2O mix

—"—

Acetate of Lime & Acetate of Baryta & Sact H2O. Mix
" " " & Nit Amonia H2O. Mix
" " & Nit Acid. H2O "
Sulphite Soda
Nitrate Potash } & Sact. H2O mix
" " & Nit Amonia. Carbon Ruthenium & Palladium
fair - Zinc mix
Ditto Nitric Acid. Carbon - Ruthenium & Palladium fair

—"—

Bisulphite Soda
Sulphate Sesquioxide } & Sact - H2O. mix.
Ditto & Nit amonia H2O mix.
" " Nit acid H2O "

—"—

Sulphite Zinc
Protoxide Zinc } & Sact - H2O Mix.
Ditto & Nit Amonia. Indium on Carbon very Sensitive
by again
Ditto & Nitric acid H2O mix

—"—

Valeriate of Zinc
Pyroglelic Acid } & Sact & Nit Amonia. H2O. Mix.
Ditto & Nitric Acid H2O "

—"—

Hypoclorite of Lime
Nitrate Magnesia } & Sact. Carbon. Cobaet bally.
Ditto & Nit Amonia H2O. Mix
" & Nit Acid. " "

Batch

with Amonia Hydrate. no good. Defined
Solution should be mixed with this for Experiment

—"—

Valeriate of Zinc & Sact. Carbon. Manganese bright
red mark - Zinc mix
Ditto & Nit Amonia. Carbon. Manganese bright red.
Zinc - mix.
Ditto Nitric Acid. Manganese bright red mark.
Zinc mix

—"—

Nitrate Magnesia & Sact. H2O Mix
" " Nit Amonia - Manganese Carbon
good red mark - Silver black - no ~~of~~ Zinc mix.
Ditto - Nitric acid. Carbon Manganese bright red
Zinc - mix

—"—

Hypoclorite Lime & Sact. Carbon. Manganese
bright red mark - Zinc nothing
Ditto & Nit Amonia. Carbon Manganese bright
red mark. Silver black.
~~Ditto & Nitric Acid~~

—"—

Acetate of Copper & Sact Carbon Manganese
Red mark Zinc mix
Ditto & Nit Amonia. Carbon - Phoenomenon
Manganese Red mark. Silver black - Zinc mix.

—"—

Citrate of Potash & Sact. Carbon. Manganese
Bright Red Mark. - Zinc mix.
Ditto & Nitrate Amonia. Carbon. Manganese
Bright Red mark. Zinc mix.

—"—

Lactate of Zinc & Sact. Carbon. Manganese
Bright Red mark. Zinc mix
Ditto & Nitrate Amonia. Carbon Manganese
bright red mark. Zinc mix.

Edison

Hypo phosphate of Manganese + Sulf. H+O. Nix
Ditto + Nit Amonia. H+O. Nix

Formate Amonia + Sulf. H+O. Nix.
" Nit Amonia. Carbon. Ruthinium
+ Palladium fair. R. best yet

Phosphorus Acid + Sulf. H+O. Nix
Ditto + Nit Amonia. [illegible]ting. R. Ruthinium
fair.

Bromide of Manganesium + Sulf. H+O. Nix
" " + Nit Amonia " "

Chloride of Uranium + Sulf. H+O. Nix.
" " + Nit Amonia H+O. Nix

Bromide Potassium + Sulf. Platina on Carbon a faint
yellow mark
" " Nit Amonia. Carbon Ruthinium most
sensitive yet. Try again

Bromide Mercury + Sulf. H+O. Nix
Ditto + Nit Amonia. Zinc Arsenic very sensitive
Try again. Yellow mark

Sulphate of Cellorphia + Sulf. H+O. Nix
" " + Nit Amonia " "

Tung State of Amonia + Sulf. H+O. Nix
" + Nit Amonia H+O "

Batchelor

Hypo phosphate of Manganese + Sulf. Carbon. Manganese
Red mark - multiply disappears. Zinc. Nix
Ditto + Nitrate Amonia. Carbon. Mang. Red
Mark Melancholy disappears. Zinc Nix.
Carbon Silver Black Mark

Formate of Amonia + Sulf. Carbon Mang. Red
Mark Zinc Nix.
Ditto. Nitrate Amonia. Carbon Ruthinium + Pall.
zinc fair Ruthinium best yet. H+O. Nix

Phosphorus Acid + Sulf. Carbon Manganese
Red mark Zinc Nix.
Ditto + Nit Amonia. Carbon Manganese
Red mark Silver black mark Slight.

Bromide of Manganesium + Sulf. Carbon. Mang. Red Mark
Ditto + Nitrate Amonia. H+O. Nix

Chloride of Uranium + Sulf. Carbon Mang. Red Mark.
" + Nit Amonia " " " " "
Silver Black on Carbon.

Bromide Potassium + Sulf. Carbon Mang. Red mark.
" + Nit Amonia " " " " faint

Bromide of Mercury + Sulf. Carbon Mang. Red mark
Ditto. Nit Am. Mang. Red Mark.
Silver faint on Carbon.

Sulphate of Cellorphia + Sulf. H+O. Nix
" " Nit Amonia. Manganese Carbon. Fair Red

Tungstate of Amonia + Sulf. H+O. Nix
" " + Nit. Amonia. Carbon Mang. Red
Mark. Zinc Nix

Edison

Acetate of Lime + Sact. H+O Mix
Ditto + Nit Potash H+O Mix

Cyanide Potassium + Satt. Carbon. Cobaact
Quit sensitive try again

Ditto + N Potash. H+O. Mix

Hyposulphite Sodium + Sact. H+O Mix
Ditto + Nit Potash. H+O. Mix

Sulphate of Cadmium + Sact. H+O Mix
" " " + Nit. Potash " "

Nitrate of Uranium + Sact. H+O Mix.
" " + Nit Potash " "

Pyrogallic Acid + Hyposulphite of Soda. H+O. Mix
Ferrocyanide Potassium
Nitrate Uranium + Sact. H+O. Mix
Ditto Nitric Pot. Coaact Carbon good try again

~~Phosphoric acid~~
Formate Amonia
Phosphorus acid + Sact H+O. Mix
Ditto - Nit Potash " "

Chloride Uranium
Bromide Magnesia } Sact H+O. Mix
Ditto. Nit Pot. " "

Bromide of Potassium
Mercury } Sact. Arsenic on Zinc
Ditto - Nit Potash. Iridium on Carbon
Arsenic on Zinc - Comparatively Sensitive

Tungstate Amonia
Sulphate Morphia } Sact. H+O. Mix.
Ditto Nit Potash Ruthenium on Carbon
Bair.

Bakelor

Acetate + Lime + Sact. Carbon Clang Red Clands.
Ditto. Nitrate Potash. H+O. Mix.

Cyanide Potassium + Sact. Carbon Clang Red Marks
Zinc Nothing
Ditto + Nit Potash. Carbon Clang Red Marks.
Silver black.

Hyposulphite Sodium + Sact H+O Mix
Ditto + Nit Potash. H+O. Mix

Sulphate of Cadmium + Satt Carbon. Clang Red Marks
" " + Nit Potash. Carbon " " "

Nitrate of Uranium + Sact. Carbon Clang Red Marks
" " + Nit Potash. " " " "
Silver on Carbon black.

Pyrogallic acid Hypo of Soda H+O. Mix.

Ferrocyanide Potassium
Nitrate Uranium + Sact. Carbon Clang Red
Ditto Nit Pot. H+O. Mix.

~~Pyrogallic acid~~
Phosphorus acid
Formate Amonia } Sact. H+O. Mix.
Ditto. Nit Potash. Carbon Clang Red.
Silver Slight black marks

Chloride Uranium
Bromide Magnesia } Sact. Carbon Clang Red.
Ditto. Nit Potash. Carbon " "
Silver Slight black

Bromide of Potassium
" " Mercury } Sact Clang Red on Carbon
Ditto. Nit Potash. " " " "

Tungstate of Amonia
Sulphate Morphia } Sact Carbon Mangled
Ditto Nit Potash - H+O. Mix

Edison

Acetate Lime
~~Cyanide Palladium~~ & Sact. Carbon Ruthenium fair
Ditto Nit Pat. H+O Nix
— " —

Sulphate Cadmium
~~Hyposulphate Sodium~~ & Sact H+O Nix.
Ditto. Nit Pat. H+O "
— " —

Stannate of Soda & Nit Pat. H+O. Nix
" " Sact. H+O. "
— " —

Chloride Cadmium. Sact. H+O. Nix
Ditto Nit Pat. — " — " "

Tartaric Magnesia & Sact. H+O. Nix

" " & Nit Pat. H+O "

Sulpho Cyanite of Mercury & Sact " "
Ditto & Nit. Pat. " "
— " —

Reperino & Nit Potash. H+O Nix
" & Sact " "
— " —

Sulphate Cerium & Sact. H+O. Nix
" N. Potash. " "
— " —

Arsenate of Amonia & Sact. Nix
" " " & N. Potash " "
— " —

*Chlorat Antimony & Sact. Ruthenium on Carbon
quite ~~cancelled~~ - more so than anyone for -
Platina marks very small on Carbon - Magain.
~~Rosenow Grow~~ Bully - Red - Not - Chlorat Antimony
Nitrate Potash Platina Marks
Fair on Zinc. Experiment with it.
— " —

Uriate & Amonia & Sact Nix
" & N Pat "

Batchelor

Acetate Lime
~~Cyanide Palladium~~ & Sact. Carbon Mang Red
Ditto Nit Pat. H+O Nix
— " —

Sulphate Cadmium
~~Hyposulphate Sodium~~ & Sact H+O Nix
Ditto Nit Pat " "

Stannate of Soda & Nit Pat. Carbon Mang Red.
Zinc - nothing.
Ditto & Sact. Carbon Mang Red marks.
— " —

Chloride Cadmium & Sact - Carbon Mang Red - marks.
Ditto Nit. Pat. " " "

Tartaric Magnesia & Sact. Carbon Mang Red.
" " & Nit Pat. Nix -
— " —

Sulpho Cyanate of Mercury & Nit Pat. Carbon - Silver
not very good
Ditto & Sact - no good.
Reperino & Sact H+O. no good
" & Nit Pat.

Sulphate Cerium & Sact.
" " & N Potash. Silver on Carbon.
— " —

Arsenate of Amonia & Sact Nix
" " N Potash Nix
— " —

Chlorat Antimony & Sact *Dont forg ~~chlor~~ Chloride or chlorate. marked Carbon Manganese Red.
Ditto & N. P. Good on Zinc & Manganese
black mark on Zinc

Goder little fisher

Uriate of Amonia & Sact. Nix
" & N Pat. Nix

Edison

Phosphate Soda & N Pot Mix
1. " Sact "
— " —

Chloride Manganese & N Pot - Platina on Carbon very slight.
" " & Sact. No. Good.
Glacial Phosphoric Acid & Sact - no good
Dito & Nil Pot — " " "

March 10th Experiments on Pyrogallic Solution and Silver Nen. Chloride combines with Pyrogallic show no reaction with Silver - Phosphate of Potash & Nitrates show the reaction. Nitrate of Ammonia, better than Nil Silver. It is the hydrated base which does the business. Pyrogallic. Nitrate Soda in small quantity - Caustic Potash just sufficient to turn the solution a deep yellow - when well shaken gives the most delicate results with Bedly for short circuit - the marks are black staining about on 10.000 Ohm a slight mark of considerable delicacy is obtained readily no good is gained. The paper has a light brown color, to a solution of Pyrogallic acid & Phosphate of Potash a very small quantity of Caustic Potash is added, there will be a white precipitate or milkiness & the solution does not become colored. Caustic Potash is to be added, but not enough to re-dissolve the milkiness, further the liquid becomes colored. Paper dipped in this milky solution is white, although the marks are not so deep a black as some of the Pyrogallic Solutions the loss of Equal Sensibility after the paper has become dry. There are as black as any, this appears to be a 1st class solution. Patent

Batchelor

Phosphate Soda & N Pot Mix
" " & Sact. Many faint red Carbon.
— " —

Chloride Manganese & N Pot. Many red Carbon
" " & Sact - Mix.

Edison 13
Batchelor 13
Mans 13
F & 13 low
Chalby

March 10th 1895 Edison

Sulphite of Magnesia + Sact No good
Ditto + Nit Pot — " — no good

Sulpho Carbol Soda + Sact. nix
Ditto + Nit Potash — " — nix

Chromate Potash + Nit Pot. Platina on O extra faint yellow mark.
Ditto + Salt. Nothing but Iron on O. red mark fair
— " —
Sulfoniate Sodium + Nit Pot. nix
Ditto + Sact nix.
— " —

Acetate of Zinc + Sact. nix
Ditto + Nit Pot. nix
— " —

Acetate Magnesia + Sact nix
— — N.P. nix

Bromhydr Natrium + N Pot. nix
Ditto + Sact " "
— " —

Borate of Mangan + N.P. nix
Ditto + Sact "
— " —

Hydrar-g Acetic + Sact. nix
Ditto + Nit Pot. Platina slight. hydrargum
— " —
Hypophosph Iron + N Pot. nix
Ditto + Salt "

Caffeine + Sact nix
Ditto + Nit Pot "
Chlor Propylamin + Sact nix
Ditto + N P "
Wild Indigo + Salt nix Ditto + N.P. nix
Canada Thistle + Sact nix Ditto + N P nix

March 10th 1895 Batchelor

Chromate + Potash + Salt. Silver Red mark metallic
Chromium - initially disappears.
Ditto + Nit Potash. nix.

Batch got
Nothing on any of the Solutions
on the opposite page
Batchelor

Edison

Wild Bergamot & Salt Platina on A.
good yellow. Iron fair
Ditto & N.P. - nix

Sodium Sesquitannin. Pyro acid & Sact - Platina very good.
Ditto & N.P. Silver & Platina. both mark on A

— " —

Pyrophosphate Iron & Sact & Pyro gallic - Platina on A very fair.

Acetate Mercury & Pyro & Sact. Platina good on A.
All the previous list with Pyrogallic no good.

Platina only
March 16th 1895

Lactate of Iron & Sact - nix.

Acetate of Strontia & Sact - nix

Oxalate Cobalt & Sact - nix

Carbonate of Bismuth & Sact - nix

Ptlor

Oxalate of Copper & Sact nix

Lupeline & Sact - nix

Nitrate Zinc & Sact - nix.

Phosphate Lead & Sact - nix

Oil Sassafras & Sact nix

Bachelor

Wild Bergamot & Sact nix
" " & N.P. "

Edison
Batch
for
Agaro
Charly
12

March 16th 1895.

Lactate of Iron & Nit Soda - nix

Acetate of Strontia & Nit Soda - nix

Carbonate & Bismuth & N.S. - nix

Oxalate Copper & N.S - nix

Lupeline & N.S ~~Soda~~ nix

Phosphate Cad & N Soda - nix

Oil Sassafras & N.S nix
Microcosmic Sact & N.S "

Acetate Strontia & N.S "

Edison

Micro Cromate + Sact mix.

Chlor Lead + Sact mix

Chlor Stronta + Sact mix.

Bromide Cadmium + S. - Bellyon Electromalograph

Chlorate Zinc + S. - good on " "

Oil Wintergreen + S. mix

Marck 6th. F. + C. E.

Logwood Chips + Sact very sensitive P to H

Pyrogallic acid + Ferrocianide Soda + Sact. Black Mark - Platina Co. - Fair

Ferrocyanide Potash + Sact Red Fok on Iron.

Bachelor

Chlor Lead + NS - Mix

Iron Chlor. + NS - mix

Bromide Cadmium + NS. Really out for Electrotype

Chlorate Zinc + NS good on "

Oil Peppermint + NS - mix.

Chlor Barium + Chlor Nickle Sact - Mix

" " " + NS. "

Chlor Bromine Chlor Nickle + Sact Black Mark on Zinc - but wont mark on the Bromine heavy tissue paper. Marks after made are permanent

Bromide Potassium Chlor Nickle - Black mark on H. wiped out by Oxygen.

Brazil wood, after trying some 15 26 28 42 981 different solution of Brazil wood were come to the conclusion that it is not worth a damn Sodis Paladium Chloride being the only one that was worth anything.

Lavender Flowers & Sact. nix.

Purslane & Sact. nix.

Low Cadweed & S. Pow N. faint yellow mark.

Arbor Vitae & S. nic.

Squaw Vine & S. nic.

Peruvian Bark & S. nic

Purple Pitcher Plant & S. nic

Flowers Moss & S. Pow N. faint yellow mark.

Sassafras Bark of Root & S. nix.

Poke Berries & S. nix.

Arnica Flowers & S. nix.

Mountain Mint & S. Pow N. faint yellow.

Shagbickory Bark & S. Pow N. - good yellow mark

Red clover Heads & S. nix

Shagbickory Bark & Nit Soda. Pow N. bright yellow mark.

Horse Radish Root & N. Soda. Pow N. - yellow mark

Elder Flowers & S. nix

Stramonium Root & N.S. nix

Blue Skull Cap & S. nic

Wild Indigo Leaves & S. nic.

Buckhorn Bark & S. Pow N. red mark fair.

Sassafras Leaves & nix

Samphire & S & N Soda. nic.

Lizard Tail Root & S. nix.

Mullein Leaves & S. "

Mountain Mint & N Soda. Pow N. faint yellow

Tamarack Leaves S. nix.

Beech Drops & Sact nic

Whiter Poke Root & Sact. nic

Elecampane Root & Sact. nic

Rockey Top Grass & S. nic

Chamomile Flowers & S. nix.

Rosylock Flowers & S. nix.

Coppyleaves & Flowers S. nix.

Bachelor Button & S. nix.

Burdock Leaves & S. nic

Abscen Root & Salt. Nic

Skunk Root & S. Nic

Nerve Root. Valerian & S. Nic

Mullein Leaves & S. Nic

Queen Meadow Root. Nic

Wild Cranes Bill Root & S. Nic.

Malt & S. Nic

Am. Hellebore Root & S. Nic

Scabious & S. Nic

Climbing Bittersweet Berries & S. Nic.

Sulphate of Iron & Salt. no good.

Tannate of Zinc & Salt. " " "

Fer Chloret acetylsalicyl acide & Salt. Gallic - very sensitive on O.

Elaterium & S. No good.

Chloride Barcum & Salt. nix

Hydrang Oxydat. Flav. & Salt. nix

Proto sulphate Iron - Nitrate Soda - Pyro - & ~~Nit Soda~~
Nitrate Uranium. Bneln Red. Hot
Edison Paraffin Carbon For chalky 13 hr

Electro Motograph

Nit Soda. Fer Chlor & Salt
Platina to Zinc friction increased.
Enormously - splendid - very good mark
on H. would answer for stock machine

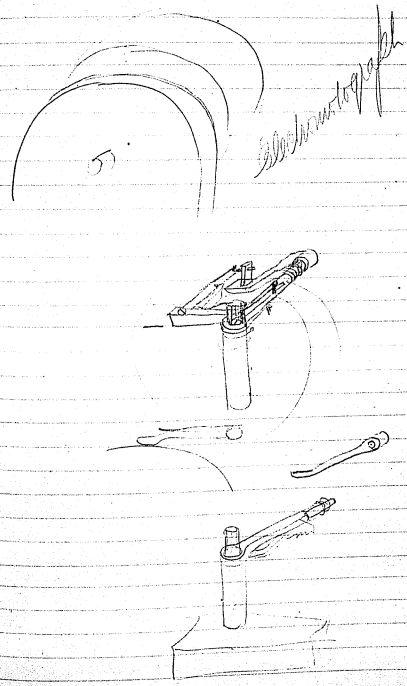
Sulph Cy Potassium - Nit Potash - Nit Lead
Chlor Soda. marks without a current violen
current comes on from silk pile stop
mark.

Clfe - Nit K. Tannin - Nit Ar Tannin
ChlNa Hypo Na —
Beautiful strong deep black Post
Neg white Brown Blue of
Equal delicacy may be
useful

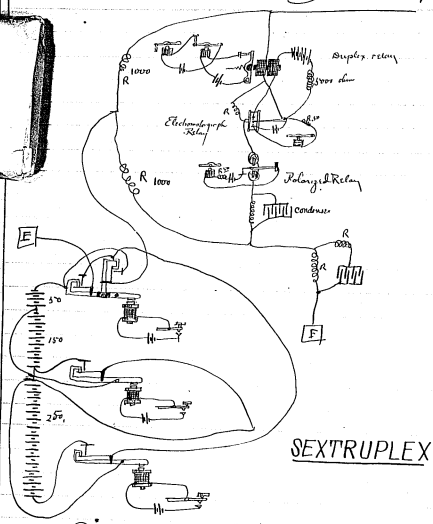
Electromotogh

Oil Sweet Almonds
Clfe Na Cl - Plat on
H friction Enormous
greatly [illegible]

Edison 12


Electromotograph

August 20 1875



SEXTRUPLEX

Edisons Sextruplex Telegraph

By this apparatus three messages may be transmitted in one direction and three in the opposite direction all at the same time over one wire, I send positive and negative currents from 100 cells to effect the movement of the lever of a polarized relay at the distant station and transmit one message and increase the strength of the current by the addition of 150 cells extra to effect the lever of a Duplex Common relay (ie) a common relay with two coils of fine wound on to cores, to transmit a

second message, I then add 250 cells more over the 150 to move the lever of my Electromagnetic Relay to transmit the message

The addition of the 250 cells is prevented from working the duplex relay by having the lever of the Emg close a local circuit in which is a battery whose current circulating in the extra coil on the duplex relay balances the current from the 250 cells. The lever of the Emg moves very much quicker than ~~that~~ a magnet no jump is noticed =

Written & drawn
August 20th 1875

In the above drawing I have shown the Emg with a single lever for currents of one polarity. It should be thus :—

so that it responds equally to reversed currents

Aug 20 1875 =

Aug 5 74

Aniline Solution

Best so far is Aniline, Chl Zinc, Nitric Acid to which is added Chl Iod, will do without this.

Citric, Tartaric & Acetic acids added to the Chloride & Nitric Acid work well, Chloride Lime dont work, Mercury Nitrate & Aniline with Nitrate Ammon for Conductivity fades but its nearly as sensitive as Iodide, Both the Aniline Sols alone & Mercury & Anilines Coagulen are more sensitive. The dress chl paper is Glacial Phosphoric Acid, Salt, Nitric A dont work well, Glacial Acetic A added improves it slightly.

It wont do to use too little aniline,

Aniline Nitr Bmg April 5 74

Quinine Sulph. N.O. Chlsod, Hyd Ammon.

marks with tin pen on Hydrogen acid, Platina shows Edsons N.F good on both. Tin on Hydrogen side shows well, The tin pen marks black but its not so very sensitive, Lead pen is most sensitive, N.F. shows splendid on this solution, Extra Good I think on account of the lead being reduced & giving a mark I think this is necessary for that purpose that the lead, should be reduced to get sensitiveness, though platina shows it on short clct it went on 10000 ohm & 6 Cells Carbon while Lead is fearful thing,

Aniline, Excess. lime water, boiled for some time & then filtered hot, Yellow Solution, No marks but Lead shows extraordinary strength N.F. better than Quinine above, I find on trying Palast that it is as good probably more sensitive but above appears to act sharpest and cleanest, paper smoother, I added salt to Cost, but no marks obtained,

Edsons Patchett adams Fine charly 1/2 f. 6-74

Alcohol & Nitric A with little water splendid with Lead N.F. thank it best, the longer the Solution effervesces the better it gets, - tried another do 1/2 hour better yet - tin pen did much best, Oxalic or Caustic K Kill it almost entirely - bad for Iodes too,

Aniline N.O. Hydrochloric A Blk Ox Mang followed pretty good green fore - ~~Fine~~

Alcohol & Nitric A. too much Acid decomp N.F. suddenly immense nitric fumes NF none, with lots alcohol with A. NF the very strongest,

Aug 7th 1874 4 AM.

Pyrogallic Acid with salt & lead pen very sensitive on Hydrogen & pen. White paper & blackish brown mark. Paper seems to be less sensitive as it is taxt. all pens mark in Hydrogen also except silver.

Excess of Chl Na & Pyrogallic acid seems to be best

Auto sensitive even when small amt of Pyrogallic Ac is used

Chl Zinc kills it entirely

N H4 added to Salt solution no good.

Seems to be exceedingly sensitive to 'New force'.

Platinum marks on this but not as sensitive as lead which seems to be the best.

Platinum also gives on O side a not very sensitive pale yellow mark

Changed the Instrument here Platinum & Iron drum

Pyrogallic Acid & Citric Acid do mark at all in any pen

Pyrogallic Acid & Nitric Acid & Salt lead marks on small resistance & very good.

Gallic acids mark something like the same as Pyrogallic

Here last it seems may be due to the metallic drum on which they were tried as we changed it from Platina & Iron.

witness Batchelor

See Page 162

Edison

New Force Electromotographs

Alcohol no good

Alcohol + HO " "

Sulphide Potassium " "

Fluid Sol. appears to be very good

Operated & recorded with Electromotograph (900) three hundred words per minute

10000 ohms & 6 cells of Carbon

with ordinary Fluid paper & that rather dry. with lead & a point.

Also tried winding several layers of paper round the drum but impracticable. Put a piece of paper under lead & kept it there constantly impracticable. Shunted Instrument with battery two both ways apparently of no use. The new machine with double spiral spring adjustments is a success much better than the other one gone to P.O.

We tried if the mere passage of a current produced the force by making a bow of the lead but it did not.

Phosphorus Water No good.

39 Continuous hours work

Batchelor witness

Adams

Charley

Edison

Aug 4th 1874 6 p.m.

Relative Delicacy

The Pyrogallic & Gallic give very sharp writing but they lack delicacy they will make very nice salts for short circuit work & are not as yet of sufficient delicacy for long circuits they probably can be made so by further experiment. Excess of salt as yet seems to be the best for them

Solubility of Gallic although slight appears to give as good results as the more soluble Pyrogallic

Oxalic acid added 1 Rg Ferrid which Prussian blue is said to be insoluble did not increase the delicacy of reaction nor alter the characteristics of marks but somewhat whitened the paper

Nitrate Mercury & Amm. Nitrate (chlorides form ppt.) gives a delicate solution on pen on O with small normal tall it is a little more delicate than Pyrogallic but not of a very permanent character. Could some compound be put in the paper in which the mark is insoluble it would be a valuable addition

When combined with Aniline red or Magenta which was previously oxydized by Nitric acid & decolorized greatly increases the sensitiveness of the paper it is then more sensitive than regular Ferrid with little normal tailing (2m pen on O) as yet we have not succeeded in making it very permanent More delicate than all these solutions is Aniline red or common Small

crystallized Magenta the proper name of which is perhaps Hydrochlorate of Rosaniline. This readily dissolves in water forming a deep red or carmine with extraordinary coloring properties

By adding to the solution in water a certain quantity of the red forming Nitros Ac. the aniline becomes oxidized & made nearly colorless.

In this solution is added a small quantity of vegetable ac the action of which I do not clearly understand of Tartaric Citric Acetic & Oxalic acids the latter of which is the most sensitive & gives the best writing

Lip pen is used on O

The action of which is that the O forms a peroxide ~~or perhaps~~ which is one of the best known reducing agents & that portion of the decolored oxidized aniline in the immediate vicinity of pen is reduced to deoxidized & its original color which is red at first but by contact with air it becomes colorless

The marks are very permanent the sensitiveness nearly equals if not quite Iodine. The defect of this ink is that the marks are so faint at first that they can scarcely be seen in fact at first they are not at all visible. This defect we shall probably be able to get rid of

A Combination of Pyrogallic with Gallic & Chl. Sodium gave no better results

Edison

Saturday Aug 9. 74

N Force,

24 parts NO 24. Nitric A. 24
Alcohol, to which added little nitrate
Silver - supposed to make fumbling
silver, Lead shows nothing on O or H,
but platina shows on O only.
Silver gives faint mark big at first thus on O.
— .... — — — — Silver shows
Nf on O + tin, -

Alcohol. Stannous Chloride, Nitric A.
no marks no Nf. - also NO added
Nf -

Tannic Acid + Salt. Nf very powerful
Cadmium work but not so strong as
Lead. it appears to be more powerful
than dryest ferro reg -

Permanganate Pot, is not bleached
or marked by any pen 14 nr. O,

Tannic A no mark with
6 cells on 10,000 ohms lining
perf paper 50 words per min

Edison 12
Batchelor 12

per Chl Iron, Ferricyanide Pot,
platina pen on H. H reduces
perchl to protochl + ferro solution
a blue - Must have platina drum
or paper gets bad, gives about
same delicacy as singular ferro,
might be made with varying ferro Iron

Another Equally good Ferro &
perlosul Iron, ought to be
perlo-chl iron, & chl Sod.
platina pen. Make protochl a
higher or + ferro solution
blue -

Electromotograph: the force is not increased
by putting the instrument in a magnetic
field or magnetizing the drum or magnetizing
the point of iron.

New Solution Good more delicate than reg
ferro, Platina pen = O. Protosulphate
Fe, Tannic Acid + Nitrate Ammonia, all of
which want to be concentrated.
Distilled water best.

New Solution. (Phenomenon extraordinary)
Pyro gallic Ac Protosulph Fe Nitrate of
Ammonia. More delicate than the
Tannic Ac Sin pen on H. Delicate
when just touched the paper but no
mark with pressure
Platinum the same shape, than sin
pen delicate may with slightest pressure
Delicate with lead and slightest pressure

Gallic Ac. Nitrate Amm + Prot-
- sulphate Iron is not so delicate on
short circuit ~~as~~ long circuit about the
same marks with same pen
Batchelor 12 Edison 12.

Aug 10th 1874

Catechu solution no good
Catechu with Chl Sodium gives mark
but not very good
Catechu Chl Sodium + Prot sulp Iron
mark but not very good

Sumac solution no good
Sumac + Salt gives mark on short
circuit but not delicate black mark
on nearly white paper
Silver also marks on Hydrogen in this
solution
All pens mark on short circuit
Sumac + Salt + Protosulp. Iron no good
Sumac + Nitrate of Ammonia no good
but marks of course short circuit

Walnut shucks + Salt mark on short
circuit but not very sensitive
Walnut shucks + Salt + Pyro gallic Ac.
not so good as Pyro + Tannin
Walnut shucks + Salt + Sulph Iron
no good. but marks.

Yellow Aniline dyed worst with
Salt Nitro Ac or Pyrogallic acid

Butternut shucks + Salt mark but not
sensitive on H with lead, Zin + Tellurium
No particular marks on O
Butternut shucks Salt + Proto sulph Iron no good
Sulph Iron kills butternut shucks.
Butternut shucks + Tannic Ac no good Tellurium
very black on short circuit
Butternut shucks salt + Phosp Ac. no good.

Madder solution Salt + Protosulph Iron
Good marks on sht ct not sensitive
Madder + Salt + Cand Pot. Tel strong on sht ct.
but not very sensitive
Madder + Nitrate Ammonia mix
sh ckt good
Madder + Nitrate + Potash no good. (Ckt sht ok.)

Fustic + Salt Tel. lead + Zin + ~~Iron~~ good
sht ckt on H Iron good sht ckt on O.
Tellurium good on H about equal to Tarred
lead does not mark good on Fustic in fact
very inferior.
Hematic, Salt + Pyrogallic good on sht ckt
Tellurium rather sensitive
Fustic Salt + Nitrate Am no better.
Fustic + Walnutshucks Tel pretty good not as
good as Fehid
Fustic + Tannic Acid Salt + Chl Iron every
pen marks on H but more on O + more as
sensitive as Tarred thing. Tellurium good
Tried also Chl. Gold but no better.
Edison 12 Batchelor

Aug 10th 8 pm 1874.

Walnut chucks after standing a day seem to be much more sensitive for Selenium on H. other pens good on chk chk.

Aug 11th 11 pm 1874

Ruthenium.

Ruthenium pen on O

Salt no good.

Ordinary Ferro paper which is bleached white & nearly dry was the first on which we received marks these marks were received in 6 cells 3 of through 3 water rheostats 1 Bradley Rheostats & 2 feet of wet hemp string, saturated with Ammonia

Sulphide of Amm. + H_2O. No good

Alcohol + HO. no good

Ferrocyanide Pot. gives blue on short chk. but light yellow + quite sensitive on 3 HO Rheos, addition NaCl dont help it much

Sulphocyanide Pot. No good except dry + on 1 Rheo in chk out —

Mixture NaCl, + Ferrocy with it no good.

Sul Quinine Hy Am + Na Cl. No good. noticed that if allow pen stop on paper little it sticks to it, though 3 Rheos, may be something in that.

Sulphurous acid No good.

Neutral Nitrate + Ammonia Hydrate No good.

St Sulphydric acid no good

Ferrid alone. yellow very sat val. very fair, try again

Permanganate KO, bleach on H. something on O. try again

Sulphate Zinc through the 3 Rheo: + 1 Bradley gives dot when you put pen down + it gives the same as often as you just the pen down but it is only on the first closing of current.

Nitrate Cop on H good.

Salt added to Sulphate Zinc makes it no better.

Following No good, Stannous Chl. = Au Cl. Phosphorus NO, Sul Magnesia – Sul Soda Hypodulphite Soda – ~~Nitrate of~~ = Nitrate strontia, Nitrit Lead, – Sul Ammonia Cupro sulphate, Citric A, Tartaric Antimony, Plumbic Acetate, Nit Soda, Acetate Soda, Sul Manganese, Gum Arabic, Acetate ~~Ammonia~~ not good, Stearic Acid, Carbonic Acid, Anemonic Acid, Hydriodic not good = Car b Soda Nitrate Mercury. Phosphowolframic a Chromic Acid, Formic Acid Stearic Acid, Salicinic Acid, Oxalic A, Anemic A Anemonic Acid Antimonic A – Boric Acid, Iodide KI – Borax, Arsenate Ammonia, Gallic A, Bromide KO, Bichromate KO – Sulphuret KO, Sul KO, Permanganate KO, Benzoic A, Ferricyanide KO, Acid KO Tartrate, Bitartrate Potash,

Aug 12th 1874 Chem. Decom.

Indigotic Acid Sulph. Indigo & Salt are good & Protochlide Iron no good
Salt & nitro Acid No Good.

E. A. Ph. 24hrs

Aug 13th 1874

Spark Induction Current:—

1. When you put one end of Secondary into fine brass filings & then dip the other wire into them & steadily lift it away from them a thin thread of filings follows & sticks to the wire. This thread we drew out to 2 inche. It seems as if the filings were soldered together for the time With Iron filings I got about ¼ inch of the filings were lighter we might get more Powdered Carbon will not do it at all I rather repels if anything.

Aug 21 1874

~~Decomp~~ Protchloride Iron & Sulphocyanide Put in the soluble red Sulphocyanide of Iron in a test tube. The one of the magnet dipped. This was surrounded by a 6 ohm spool with 6 cells Battery it produced a precipitate after about 3 hours.

~~The difference~~ Two tubes in which a slight cind of Sulphocyanide of Iron was one of which was placed within a Bradley spool & 6 cells battery. The cind within spool diffused itself immediately while the other took some time.

Aug 12 1874

12.

Aug 21st 1874 Automatic

I find that Pyrogallic Acid & Salt are no good except on a platina drum On iron drum decomposes the paper & does not give a good mark at all even in sht ckt but when Platina drum is used lead is very good on sht ckt that kills it for 'domestic' uses.

Pyrogallic & Salt & Beef extract no good
Beef & salt all pens mark on ⊕ lead especially black but fades away to a brown almost immediately.

Beef & Salt & Tellurium Pen fine black mark on sh ckt but not very sensitive to H.

Chas. Batchelor 12hrs.

Batteries Aug 25 74

Zinc, Carbon, Pure Sul. Ac outside, ~~HO~~ HO slight + Blk ox Mn outside acts like a Condenser, on closing get a momentary strong Current which very quickly ceases, under this appears to be a very weak but permanent Current addition of H O to outside increases strength but little,

Aug 25 74

Sal Ammonic Carb + Zinc in + out quite strong & steady for 1 hours, tried it no longer, added Oil Turpentine which weakened it,

Aug 25 74

Carbon NaCl, HO, Tellurium no current or Founder apparently.

Edison 8hrs

Pyrogallic Acid Salt,
Contaminate Metal. 'Phenomena'
Tin better than lead on
'Electromotograph'!
Platinum & lead good on H. for
chemical bd. all pour much N H
Pyrogal. Salt. Antom Pot. Sulphate of Iron
dark purple paper Platina & Tin bleaches
on H, lead & Tin Brown marks on O.
Strychnine Salt & Sulph Ac exceedingly
sharp black marks with lead on H

Sulpho Cyanide Mercury & Chloride Ammonium
No good on Silver Lead Platina Tin. probably
insoluable.

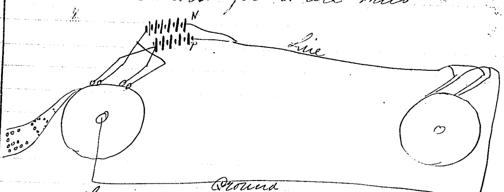
Aug 26th 1874.

Received from J.A.B. for Analysis.
Some Ore from Relief mine Utah
(Black) Sulphurets of Silver

Some Ore from Fuller mine Salt Lake
(Yellow) Chlorides of Silver

Sep 7th 1874

Made experiment of Roman letter with one wire with the two instruments & O.K. we also found out that the extra dots could be blotted out by Caustic Potash the connections for it are thus



The two rollers that transmit the bottom of the letter are set more than a full letter behind the two top ones in order to get off the letter before the other ones get on. Two batteries are used you send a positive & neg. current on the 3 & 4 pen which are recorded on all four & the same on 1 & 2 which record on all four ~~& the way they can be distinguished~~ thus: in the word 'this' T H I S when you send on 3 & 4 it commences on T & makes the two bottom dots but the two top pens make also two dots but which are ahead of the other two so:- (: :) now when you send on 1 & 2 3 & 4 also marks but behind but the two top marks meet the bottom ones in the right place & the consequence is there is the same amount of dots between the letters as the letters themselves ([dots])

12 The next letters the extra dots lap over these so in the word 'this' ([dots]) Now blot out the extra dots & you have the word (T H I S) If you take the strips when they are still damp they are very easily erased

by Caustic Potash weak. this of course is with ordinary ferrid sol.

Chas Batchelor T. A. Edison

Cost of Insts 35.00
C B 12th

Experiments to blot out the marks made by
Blot on Pyrogallic and salt And Logwood and salt

Sulph Antimony	No Change	No Change
Antimonic Acid	"	Turns it same color as
Sulphate Pot	Yellow color	Black color
Manganese Chloride	No Change	Dark blue color
Sulphs cyanide Pot	"	No change
Gamboge	"	"
Tartarized Antimony	"	Dark blue color
Stannous Chloride	"	
Oxlate of Iron	"	No Change
Zinc White	"	"
Sulphate Calcium	"	
Aniline	"	Blue
Naphthaline	"	No Change
Nitrate Nickel & P	"	"
Sulphuret Calcium	"	"
Carbonate Zinc	"	"
Sulphate Indigo	"	"
Rochelle Salts	"	"
Arsenious Acid	"	"
Gum Ignorach	"	"
" Senegal	"	"
" Arabic	"	"
" Mastic	"	"
" Camphor	"	"
Nitrate Soda	"	"
" Copper	"	"

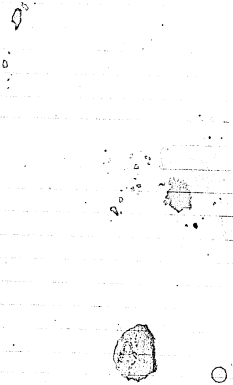
Low Partaw
10.4

Sep 14-1874

Electronitograph. Palladium drum think will be very good, with lead

Mercurie Nitrate, Aniline, & Nitros Acid
Platina on Platina is as good as lead on platinum & not thought to Alle better.

Iron drum seems better.



Sulphonaphtalic Acid
shows new force on lead on O strongly
also works well Iodat in it

Sulphoxonic Acid shows NF on O. with lead
very strongly =

Sulphomethylic Acid " " " "
when reduced with Potassic Hydrat it is
stronger than Sulphoxonic

N 7

Messlers Reagent = Not am
platinum per good — pbly the
mercury that does it =

Experimental Research

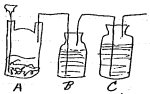
Aug 3 (1874)

Sulphate of Quinine dissolved in H_2O
No mark for O or H
in Iron, Thallium, Silver, Copper, Lead
Zinc, Aluminum, Platinum Cadmium
Sulphate Quinine dis. in KO_3 with
Chloride of Ammonium
No mark with H or O with the above metals
Sulphate Quinine dis. in Ammonia Chloride
Gave no mark with above metals on
either side when mixed separately with
Oxalic Ac Hydrochloric Ac, Carbonate Copper
Bichromate Potast, Sulphocyanide Potassium
Sulphuric Ac, Ferrocyanid Potassium
Nitrate Cobalt. Edison

Aug 4. 1874

Sulphide of Iron ($Fe\,S$)
Made this from bar Iron heated to a
white heat & pressed against a bar of
Sulpher over a water bath into which
it drops after combination with sulpher
It is brittle & has a look slightly bronzed
Batchelor

Hydrosulphuric Acid ~~& H~~



Made this in the following way
A contains Sulphide Iron ($Fe\,S$)
& dilute Sulphuric Acid ($HO\,SO_3$)
strong chemical action in
which Sulphuretted Hydrogen (HS)
is given off. which passes through the bottle B
which only has water in it & wash the gas
& from that into the bottle C filled with
distilled water which is impregnated with
Sulphuretted Hydrogen (HS) The gas after leaving
bottle C would smell obnoxious, & in order to

prevent this we pass it into still another
bottle containing Ammonia Hydrate ($NH_4O\,HO$)
which combines to form Sulphide of Ammonium
(NH_4S). The chemical change which takes
place in first bottle is shown by the
following:—

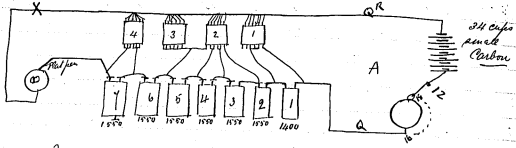
$$\underbrace{Fe\,S}_{\text{Sulphide Iron}} + \underbrace{HO\,SO_3}_{\text{Sulphuric ac.}} + \underbrace{H_2O}_{\text{Water}}$$

$$\underbrace{Fe\,O\,SO_3}_{\text{Sulphate Iron}} + \underbrace{H\,S}_{\text{Sulphuretted Hydrogen}} + \underbrace{H_2O}_{\text{Water}}.$$

Batchelor.

Cable. Sunday night May 2nd 1875

No 4 Solution



No 4 Condenser only 2 on end nearest receiver

Sample 1 Ten words per minute.
5 + 6 Condensers put in at X
Sample 2 Ten words per minute & turned uneven
Sending shunt from Q to Q R of 500 Ohms. Sample No 3.
5 + 6 Condensers out at X Samp. 4
Shunt A only 200 ohm Samp 5
Shunt A only 100 ohm Samp 6
" " " 50 ohm Samp 7
Leak of (3000) ohms between Res 2 + ground 8 Samp.
10 " " 2000 " " " " " " 9 Samp.
11 " " 1000 " " " " " " + 500 a
Shunt A
12 " " 2000 " " " " " " + 500 a shunt
13 " " 3000 " " " " " " + 500 shunt
14 " " 2000 " between bet. R 2+3 + 500 Shunt
15 " " 2000 " " " " " " "
16 " " 1000 " " " " " " "
17 " " 2000 between Res. 3+4 " " " "
18 " 2000 " " " " " " "
19 " 1000 " " " " " " "
20 " 2000 Between Res 4+5 _____
21 2000 " " " " _____
22 1000 " " " " _____
23 3000 Between Res 5+6 _____
24 2000 " " " " _____

25 Leak of 1000 ohms Bet. Res. 5 + 6 + 500 ohm shunt
the marks on this are only known by the increase
decrease of pitch Electromotograph principle
26 800 ohms plugged at in each Rheostat leak placed
between 1 + 2 of 3000 ohm.
27 ditto leak 2000 ohm
28 ditto leak 1000 ohm
29 Leak placed bet 2 + 3 Res. of 3000 ohms
30 " " " " " " " 2000 ohms
31 " " " " " " 1000 ohms.
32 " " " 3 + 4 " 3000 ohms.
33 " " 2000 ohms.
34 " 1000 ohm.
35 " " " " 4 + 5 " 3000 ohms.
36 " 2000 ohms.
37 1000 ohm
38 1 leg of magnet in each resistance box put in
+ without leak R.
39 ditto with leak R bet Res 1 + 2. 3000 ohms.
40 " " " " " " 2000 ohms.
41 " " " " " " 1000 ohm.
42 " " " " " " 500 ohm
43 " " " 3 + 4 3000 ohms.
44 " " " " " 2000 ohm.
45 " " " " " 1000 ohm.
46 " " " 6 + 7 " 3000 ohms.
47 " " " " " 2000 ohms.
48 " " " " " 1000 "
49 Leak off full magnets in all boxes 500 a shunt
50 Leak between 1 + 2. 3000 ohm.
51 " " " " 2000 ohm
52 1000 ohms
53 " " 3 + 4 3000 ohms.
54 2000 ohm
55 1000 ohm

Magnets all out.

No 1
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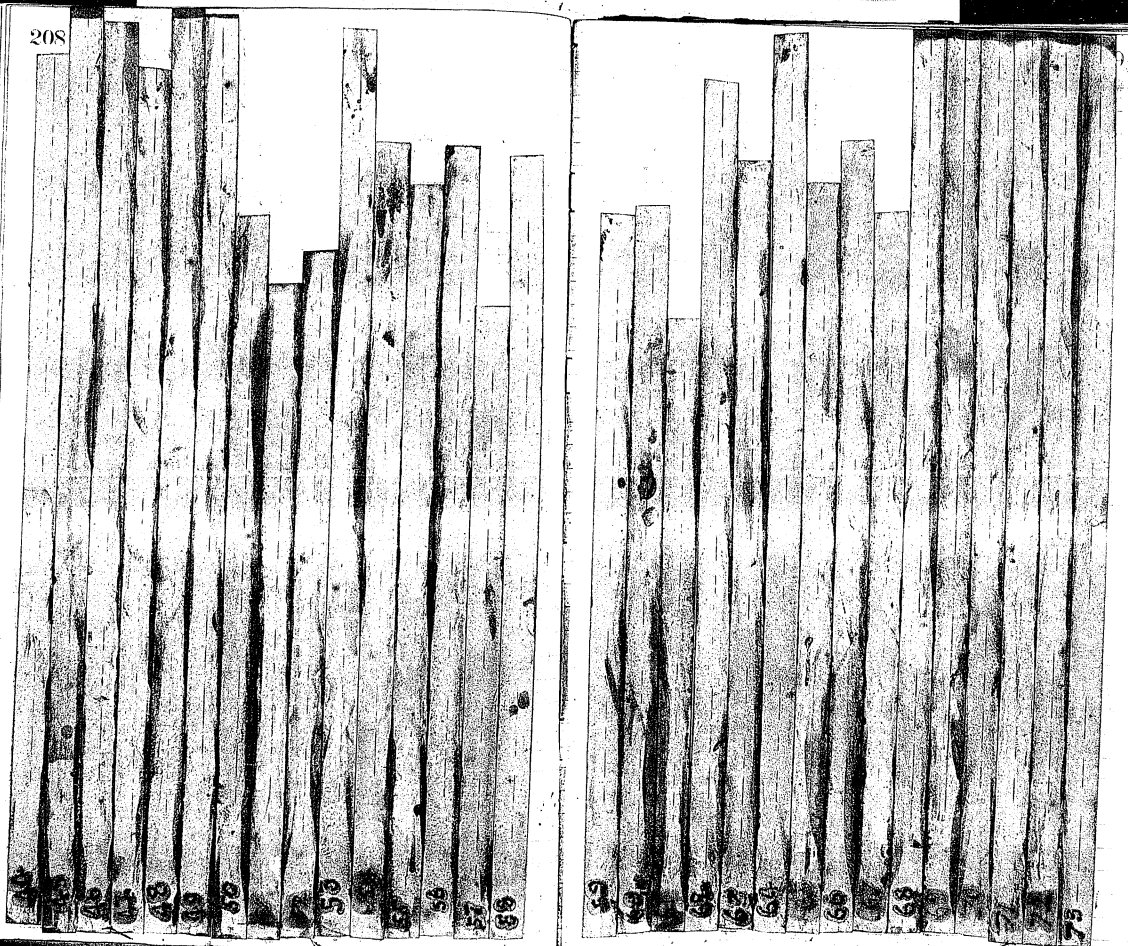
56 Leak containing 3000 ohms + 200 ohm magnet
with armature on core between 1 + 2 500 ohm shunt
57 " " 2000 ohm " " " "
58 1000
59 " " " 3000 " " " between 3 + 4
60 2000 " " " "
61 " " 1000 " " " "
62 " " 3000 " " 6 + 7.
63 2000 6 + 7
64 " " 1000 6 + 7
65 Leak between 2 + 3 3000 ohm + 200 magnet
Leak between 5 + 6 1550 oh + 200 magnet
66 Leak bet. 2 + 3 2000 ohm ditto
67 1000 ohm ditto
68 All rheostats have 750 ohms in 500 ohm shunt
Crank speed up + turning steadier on leakers
69 Ditto without shunt.
70 Ditto with 400 ohm shunt
71 Ditto " 200 ohm shunt.
72 " " 200 oh "
73 " " 100 " "
74 " " 100 " " Double speed
75 " " 100 " " 50 words per min
gone back to old speed 8 words per min
76 " " 100 " "
77 " " 50 " "
78 20 " "
79 10 " "
80 " " 200 ohm mag. in shunt
81 " " " " " " 50 wds per min
82 " " " " 750 res " " 8 wds per min.
83 " " " " 100 " " " " "
84 " " " " 200 " " " " "
85 " " " " 400 " " " " "
86 " " " " 800 " " " " "
No 5 Condenser taken from X connected round shunt
87 " 200 oh mag + 800 res in shunt
88 " " 400 " " "



89 " " " 200 oh mag 200 ohm res in shunt
90 " " " 100 " " "
91 " —— 200 oh mag only
92 " " " " " " Condenser off
Condenser 5 inserted at 12
93 " " " 200 oh mag only in shunt
94 " — 200 " " 800 " " shunt
Condenser at 12 shunted with 2000 ohms
95 —— 200 mag & 800 res in shunt
96 200 mag. magnets shunt off all together. ~~Condenser shunt~~
Condenser shunted with 2000 ohms
97 800 res. in shunt
Condenser shunted with 1000 ohms
98 800 res. in shunted
Condensers 5, 6, 7, at 12
99 ~~Same in shunt~~
100 Condensers 5, 6, 7 shunted with 3000 ohms.
101 " " " " 2000 ohms
102 1000 oh
103 Condensers 5 6 + 7 shunted with 200 mag + 400 resist
Battery put + X Receiving end
104 Conden 5 6 7 sht with 200 mag + 400 resist
105 Conden 5 6 7 not shunted.
106 Conden 5 6 7 sht with 200 mag + 1550 res.
107 " " " " " no mag + 1550 res.
108 Condensers ~~shunted~~ shunted round from 16 – 18 + also shunted with 1550 ohms.
109 Condensers shunted round 16 – 18 alone.
Sunday Morning 2 am May 2
Jd Edson
C Batchelor } 12 h 5m
E Gilliland

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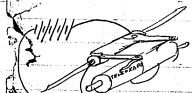
Sunday May 2nd 1875.

No 4 Solution

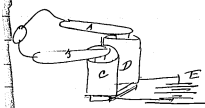
Copying experiments —
Made an instrument to copy by electricity
A round drum on which
slides 2 points No 4 paper
copied good white marks on brown
bad background can be done quick with
fine wires. Edison Batcheler Gilliland 8 AM



New. Force.

E-1676 p. 215 +15

A+B are 2 platinum plates. C D is an electro magnet. Closes by Battery E
Nothing visible on platinum
Now on brass



Ferrid paper with iron pen + brass drum make a battery track + marks, it will not do it with on platinum drum.

Tried to work from the induction of a sounder magnet 1 spool + battery + 1 + experiment.
Worked till 4 this day 3rd

Sunday Morning 3rd 9:30 AM
Edison
Batcheler
Gilliland 10h

Edison

May 31st 1875

Rotation

Found a good solution

Pyrogallic Acid

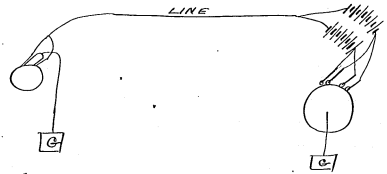
Nitric Acid in excess

Nitrate of Ammonia in excess

Yellow matt comes out reddish & marks on Oxygen.

One Wire Roman letter

Worked all night on this testing our new synchronous instrument. Ferrid paper, was able to read it almost first trial. Had considerable difficulty throughout the evening in not getting the dots on line & but getting the duplicate. found the difficulty in the perforations being wider & pens not being properly adjusted. ~~pen~~ Got tried it yet for perfect synchronism. Bad receiving pen, it must be altered.



2 Batteries 24 cells each small Bichrom. 90 ℔ Sol.
Worked all night

Edison
Batchelor
Adams
} assistants

12 hrs

May 5th 1875.

One wire Roman syncronish works very well there is a pendulum but very simple
Had difficulty with some dot dropping out which we remedied by putting a rubber ring round the receiving drum

Tartaric acid added to the Nitro gallic salt, Nit. Strong. is good making the paper whiter & making enough acid solution to prevent those dots

Sulphuric acid & Phosphoric ac make a good blotter for Nitro sol.

Worked all night
Edison
Batchelor
Gillette
} 17

May 7th 1875

A Test to Determine the transmission of positive or negative currents through a a Liquid alters the Resistance on account of direction of Current — It has been asserted in foreign publications that if a piece of platinum & a piece of alluminium placed in certain solutions that ~~the~~ the resistance is increased & diminished by the change in the direction of the current —

Water & chloride Sodium outside Alchol Inside two platinum Electrodes — No 1 — 73 — Reversed No 1 — 83 =

Water & chloride Sodium outside Benzine Inside two platinum Electrodes — No 1, 63 Reversed No 1 — 87 —

Adams, Edison
Batchelor & Gillilland

May 7th Batchelor fixed the Electromotograph with single lever by 12 midnight & then we went to work on repeating, & successfully repeated (200) two hundred words per Minute Electromotograph working with platina pen on Glycerine Solution samples not saved worked till 8 AM of the 8th of May

Edison, Batchelor, Adams, & Gillilland

May 10th 1875

Repeating by Electromotograph.

May 10th 1875

Repeating by Electromotograph.
worked all night. Had a great deal of trouble to get it going up till 1 a.m. could not tell what was trouble. It seemed ~~to gradually slip back when current was in & go forward too far when space came~~ as if the normal friction lessened after working a short time. after supper however it worked better with new paper & we kept getting it good till we reached (800) eight hundred words per minute perfect

Phenomenon,

Salt & Oil Sweet Almonds
Jump! only on opening. a friction jump.

Nit. Mercury – Salt.
Fearful friction on O; with Pyrogallic etches it & making a splendid double Arrow paper.

Na Cl, HO, & Capeped Oil
EMograph nix

Na Chl & Anise oil
Friction on O. No mark

Na Chl. & Rosemary Oil
Nix

Na Chl & Lavender Oil Nix

Na Chl. & Lemon Oil Nix.

Na Chl. & Mirbane Oil & K Bichrom.
more friction to X
Occ.

May 18 continued.

Electromotograph.

Coffee, egg, sugar + milk

Phenomenon decreased friction on Oxygen.

Pyro added to the above in good

Na Cl. & Caraway Oil Nix

Na Cl. + Cloves oil Nix

Na Cl + Origanum oil Nix

Na Cl + Peppermint Oil not very good

Na Cl + K Bichron. gives fearful thump on first closing only.

Na Cl. Caseful Oil + Proto Hg. good apparently better than Pyro.

Na Cl + Anise Oil mix

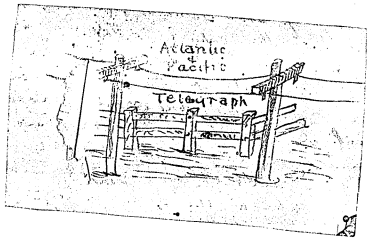
Na Cl Caseful Oil Proto Hg + Pyro mix

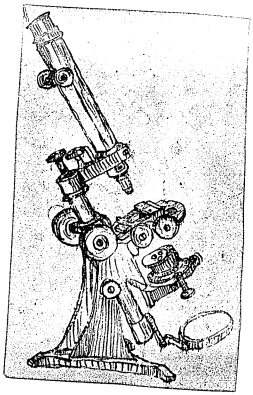
Edison, Johnson, Adams
Batchelor. 12.

New York June 1

J. C. Reiff Esq

This is a specimen of the new copying press just invented by the renowned trio Edison Batchelor & Adams





Monday May 31st

Newark N.J. June ~~X~~ 1st 1875 E-1476

The samples shown on the opposite page are the result of the first experiment tried in the new Laboratory, and for the want of a better name it will be called the Autographic Copying Press —

Tissue paper written upon by an ink composed of aniline violet and proto chloride of Iron saturated solution, the paper which receives the copy is saturated with the Ferrid Cyanide of Potassium — The ink may be the reagent for the solution in which the paper is saturated ~~and~~ produce coloration by a chemical reaction for instance, the ink may be a solution of perchloride of iron or any persalt of a metal and the paper on which the copy is to be taken may be moistened in a solution of a chemical which is a reagent for a persalt and then give a coloration

T. A. Edison
Chas Batchelor.
Jas. A. Adams
E. T. Gillilland

June ~~2d~~ 1st 1875 — No experiments tried

Error in dates altered by one "Gillilland"

Newark N J June 28

9.05 Am Experimenting, endeavoring to discover a new force — a circuit of No 17 Iron wire 25 feet in length, an electromagnet with battery is brought in contact with this wire at one end and the following contrivances are used at the opposite end to detect any manifestations

a slip of paper suspended between two points made by breaking the iron wire circuits & turning up the ends leaving the ends about one half inch apart & the paper is suspended between —

a paper saturated with Chloride of Manganese nothing that can be detected with the naked Eye — using the spectroscope gives no results —

a jet of gas is introduced between the points nothing + a candle is used — nothing —

a jet of gas is substituted for the Electro magnet = candle used for receiving — a paper saturated with salt is burned in the focus of the spectro scope. nothing —

Salt paper is burned at the sending end nothing —

Pyrogalic acid & many others are tried with same results

paper is again introduced in receiving end Electro magnet at sending end — a magnifying glass is used at the receiving end — nothing

Magnet introduced at receiving end everything else remaining the same; — paper used as an armature — nothing —

Edison Batchelor Gillland
Adams Johnson 12 Pm

all night

O was fine

E-1476

June 3rd 1875

Experiment to make a kerosene lamp John bright without chimney but without success. Tried feeding O to it but no good, need numerous entrances mixed with it but no go

12 p.m. Edison Batchelor Adams

June 4th 1875

Worked all night on celluloid made two lots of celluloid with 6 acid but did not stand test of hot alcohol. made a third lot & be tested to day with extra precautions of baking paper etc

Found a new Solvent for Cellulose (Wood naptha) hurray!! Soluble cold & I think will be cheap

Rhigolene as a solvent no good
Benzole " " " " "
Naptha " " " " "
Turpentine " " " " "
" with Resin " " " "

Batchelor Adams 12h

E-1676

June 7th 1875

Worked all night.

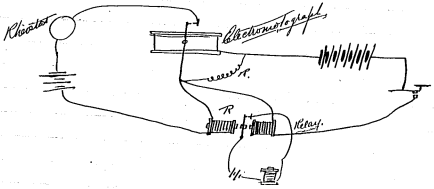
New Solvents for Celluloid:—

Alcohol & Naphtaline. cold. very good.

Turpentine & Naphtaline heat good.

Alcohol & Gum Senegal cold. not very good

Electromotograph:- Sendduplex:



Tried a preliminary experiment on sendduplex to see whether the Emg. would close quick enough as in diagram, very defective instruments. It did not work well. The principle of sending a message from each end with a send on & polarized Relay receive current with 50 cells Relay and 100 cells Emg. with 150 cells & relying on the Emg to close quick enough & neutralize the relay so fast effect & a certain extent

Ed

In working this experiment we found that when we shunted the electromotograph although there was a heavy mark by the stylus the movement of the stylus was killed.

31 for all

Edison, Batchelor, Adams.

June 8th 1875

New force all night no result.

Edison, Batchelor & Adams. 12

June 9th 1875

New force all night no result

Edison Batchelor & Adams

12

June 10, 1875.

Worked trying to dissolve sawdust soaked some in boiling caustic Potash & then tried to dissolve it also soaked some in sulphuric & nitric acids & some in HCl.

No result as yet

Batchelor & Adams

Petroleum ether caught fire while Jim had it in his hand no harm.

Edison & Johnson made statistics of A & P delay of messages

Copying press does not work satisfactory

Resolved to work daytimes & stay at home nights.

New solvent for Cellulose Nitro Benzole.

Good.

Edison Batchelor & Adams.

Now is the winter of our discontent made glorious summer
Chas Batchelor 21 ff
Now is the winter of our discontent

2nd ff
Charles Batchelor
Now is the winter of our discontent —

5th 55 copies
Charles Batchelor

No 6 No copies

Mr Edison June 11 1875

We have succeeded at last in our endeavours to take 50 copies on our press & I believe it is the first time they have been taken. It goes to prove that part of the winter of our discontent is buried in the deep bosom of the ocean

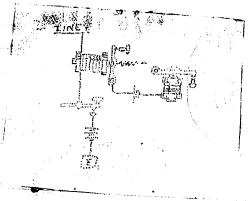
Yours in sincerest love
Chas. Batchelor

June 11th 1875

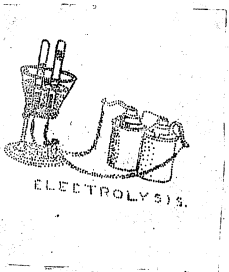
Copying experiments —

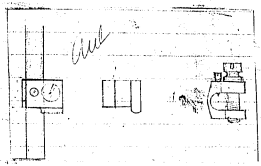
No 1 was. Solution —
~~Sol~~ — 2 fluid oz water
2 dwt Ferrocyanide of Potassium
In K Sat. sol Fe_2Cl
a little Violet aniline
a little Sugar
Pomatum grease on paper
took 21 copies
No 2. differed only in the way of laying the roller paper on.
3, 4, & 5 all took about 22 copies & differed slightly in the ink.
5 & 6. Sat Sol Fe_2Cl & Sat Sol aniline
proportion 2 Fe – 1 aniline
write with this & let dry or blot it & then coat over with Balsam for she will take 50 copies easily 55 good copies being taken with No 5 & 45 with No 6.

Batchelor & Adams
6 Wks each.



June 20th 1875





June 14th 1875

Made new arrangement for slipping on perforator rods when the key pin is broken they can be made & sent as extras & put on as the pins break.

Batchelor.

June 20th 1875

We struck the idea of making a stencil of the paper by pricking with a pin & then rubbing over with an ink.

The best ink we found to be glycerine & aniline violet. Cut a piece of steel 2 x 3 like a file but with points straight up & used it to perforate the paper by writing on it with a stylus it works but it takes such pressure to do it at all, that it is not much good, resolved to make a machine to do by clock work or engine & prick as we write, in the mean time we took numerous copies with the letter pricked by hand

Thos A Edison
Chas Batchelor
Jonas Adams
Saml Edison

12 head

1875 Experiments to find a strong constant battery

Date	Hour	Galv. 1	Galv. 2	Remarks	Date	Hour	Galv. 1	Galv. 2	Remarks	Date	Hour	Galv. 1	Galv. 2	Remarks
				200 ohms resistance on all										
Ordinary Bichromate Great battery CrO_3					Strong solution of KOH + H_2O CrO_3					Sulphuric acid / Potash SO_3 Carbon + Zinc				
June 21	9 AM	46	1		Jan 21	9 AM	34	12		~~June 21~~	~~5 PM~~	~~7~~	~~1~~	
	2 PM	62	1			2 PM	5	0		June 21	10 PM	17	1	
	4 PM	45	2	Do 1		4 PM	6	1	2					3
	~~[illegible]~~	48	2		hour	13	4	0						
23	2 PM	58	15	0			Do good.							

Lost of Iron Battery ~~outside~~ Both Poles wire kept on 25 ohms + letter on galvanometer

						1	2	3	4			
1875	Jan 23.			4 PM	72	72	93	60			Porous cup.
				5 PM	76½	76½	97	85		1	Contains NaO
				8 PM	79	78	92	84		4	Outside jar
		24		11 AM	78	78	76	56		19	Contains CrO_3 +
				2 PM	78	76	96	52		22	H_2O in porous
				6 PM	77	77	96	47		26	of 1-30.
	June	25		7 AM	46	15	81	9		41	
					15	14	16	3			

Jm

Do

1895 Chlorate of Potash & Sulphuric Acid

~~These deflections were all taken on 20 thousand ohms~~

June	Hour	Zinc Carbon	Zinc Copper	Zinc Platinum	Zinc Iron	Zinc Lead	Iron Copper	Iron Carbon	Iron Iron	Copper Carbon	Platinum Carbon	Carbon Carbon	Nitric Acid
23	3 pm	0	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 4
		52 4	46 3	42 12	[illegible]	33 1	18 1	37 1	—				
		77 57	46 33	61 40	45 17	37 29	40 17	47 21	18 20	49 20	17 1		66 16
	5 pm	47 11	64 22	33 1	48 11	62 21	19/20 5	65 15	2 1	46 12	1 0		64 11
	7 30	47 7	62 15	15 1/2	48 9	62 17	24 4	60 7	2 1	39 11	1 0		62 5
	8 30	45 1/2											
24		21 2	31 3	6 0	45 6								
	10 am												
		20 2	31 3	5 0	45 6	60 34	36 1	47 2	2 0	38 7	0 0		45 1
	2 pm	18 1	30 2	0 0	45 4	41 1	35 1	37 1	2 0	37 4	0 0		35 1
	5 pm	16 1	27 1/2		41 4	49 1/2	31 1	35 1	2 1/2	30 2			22 1/2
	8 pm	14 1	22 5		32 2	12 0	32 1	29 1		24 2			45 1/2
	5 30	13 1	22 1		19 1	13 0	24 6	27 1		23 1			43 1/2
25	9 am	28 3	41 1					43 2					50 2
	2 pm	32 1 1/2	34 1					30 1					52 2
	5 pm	32 1/2	30 1					35 1					57 2
	12 am	34 1	29 1					24 1					47 1

Batteries kept on 20 thous

on 25 thous besides the galvanometer

Bare galvanometer without extra res.

45 hrs

17

25 hrs

41 hrs

55 hrs

17

Sulphuret of Potash Tested on Bare Galv.
Repeat to 25 ohms

1845 Date	time	No. of Hrs	Zinc Carbon	Zinc Copper	Zinc Platina	Zinc Iron	Zinc Lead	Iron Copper	IRON IRON	IRON CARBON	Copper Carbon	Platina Carbon	Platina Iron			
June 23	1 pm	1	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 4			
	3 pm	2	9 0	14 3	12 0	29 4	35 19	5 2	0 0	1 2 0	12 1/2	9 0				
"	5 pm	4	21 1/2	8 1/2 2	6 1/2 0	27 2	34 5	6 1/2	0 0	1/2 0	4 0	0 0				
June 27	11 am	22	17 0	12 2	7 0	23 2	22 1 1/2	5 1/2 1	0 0	1/2 0	4 0	1 0				

Chloride of Ammonium in outside
Zinc & Carbon Electrode June 29th 1845
Battery Porous cup & rack

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1845 Date	time	hour	Chloride of Potash Sand Cell	Nitric Acid	Chloride of Potash Sand Cell	Sulph & Iron Protoxide	Sulphat Iron	Phosphoric Acid	Affords Ammonia	Peroxyde of Iron	Sulphate Magnesia	Sulphate Alumina		Affords Calcium	Affords Magnesia	Affords Alumina		Remarks
			1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	
29	11	Mn	84 37	90 46	84 41													
July 1	5	Ch	26 62 16	88 71	81 10 1/2	6 1/2 1 1/2	84 19	79 1 3/2	86 17 1/2	73 7 1/2	71 7	74 20		82 37				
" 2	10	am	47 45 18	88 80	81 24	45 3	74 32	47 11	82 1/2 33	55 8	76 15	49 20		12 2		51 4	86 6	
"	5	Ch	64 45 8	88 80	80 17	36 1/2 2	57 23	39 6	70 25	42 6	65 10	39 10 1/2		91 2		124 4	78 15	
3	8	am	69 46 7	88 80	77 17	22 1	47 12	36 4	47 10	25 3	35 5	25 5		8 1 1/2		14 2	70 11	
"	4	Ch	77 42 5 1/2	88 80	60 4	16 1/2	332 7	26 5	41 8	25 3	36 5	15 4		8 1 1/2		12 2	68 7	

Edward H.

18 19 20 21

1888

Date	time	hour	Hydrochloric Acid	
July	9	9 am	72	70½
"	2	12 m 19	60	51
"	"	5 pm 24	47	46
"	9	9 am	46	36
"	"		79	74

Date	time	No hours	1 Chlorate of Pot. Powdered	2 Nitric Acid	3 Ferrid cyanide Pot. Powdered	4 Granular Sugar Pow.	5 Sulphate of Iron Powdered	6 Oxalic acid Powdered	8 Ferro-cyanide	9 Sulphate of Magnesia Powdered	12 Chloride of Calcium Powdered
			1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 4
July 19	1 PM	0	74 31	88 83	82 47	65 1	71 15	82 25	69 18	71 10	67 82
" "	5 PM	4	77 31	85 84	75 18	78 15	72 19½	71 17	76 20	75 12½	69 15
" 20	8 AM	16	72 20	88 76	81 24	80 32	65 9	64 9	67 10½	74 18	29 15
" "	5 PM	25	65 15	88 80	79 10	76 3	48 7	38 7	50 5	70 10	19 8
" 21	1 PM	45	62 9	87 80	79 9	85 2	45 4	38 7	30 9	65 8	12 3

Sample 1

Now is the winter of our discon-
tent made glorious summer by
this son of york and all the
clouds that lowered upon our
house are in the deep bosom
of the ocean buried grim
visaged war has smoothed
his wrinkled front but now
instead of mounting barbed

Sample 2

Citizens Gaslight Co
Engineers Office cor 5th & Hy
Brooklyn July
s M. Fletcher Esq
Dear Sir,

eply to your favor covering e
res as to the results we obta
working the OLNEY PROCES
ave the pleasure to make the fo
statement.
These works have been mak
as under that patent for a pe
sixteen months with a result h
atisfying to the Comany and
consumers

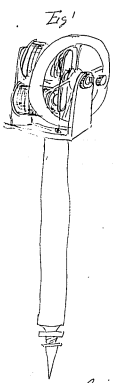
Yours Respy

Wm Henry Wh

July 20th 1875. Copying Experiments

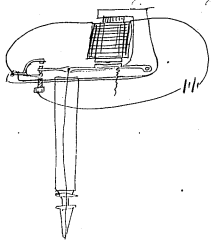
Have had a pen for pricking made to run with clockwork but found it no good so so had one made & run by electric Engine & it was finished to day. Proceeded to night & try it it worked well but ~~now~~ prick two slow

Fig 1



the cam that moved the needle was made in this way with writing slow we got along well but ~~started to work~~ making a new cam like this † which he finished & then we went to work to get the press right for working we found that if we covered the roller of press with cloth saturated with ink & rolled it over the copy it worked very good, also fastened the ~~co~~ letter round the cloth covered roller, worked well, also laying a flat piece [illegible] saturated cloth on the [illegible] the letter over it then [illegible] ing a copy on the roller running over [illegible] was got. Also in the common copying press it worked well most any way. After this we found wanted very little pressure & then a new idea dawned on us to take a painters roller with handle on it & cover it saturated cloth we also took a book & the cover out large enough & take a sheet of foolscap we then pasted our letter on the inside & then shut up the book & rolled the roller on the outside this was a perfect success & Sample 1 was struck off this way with

100 others like it.
We tried all the other aniline with Glycerine
Olive oil, molasses, some pretty fair but not as good as [illegible]
Printers ink + oil as good.
We tried to write letter on parchment but the
ink went right through it [illegible] to combine.
Started Wurth on [illegible] to be made
direct acting [illegible] getting more power like
drawing. The barrel also
to be shorter so that the
pen will be easier to handle



We propose to make our
press etc to consist of
a cabinet with iron frame
attached, + paste the
letter to the cabinet to
have a cloth top.
A rubbing roller with handle

1 Bottle (pint) of ink.
1 Funnel high twist & Porcelain coat
the last three to go inside of cabinet.
1 Cell of Grenet battery
1 Pen + [illegible]

[illegible] Beach
[illegible] Adams
Saml Edison
M Beach.

End of part

Saturday & July 25th
Sunday:- Whole Expenses for Printing Process.
"

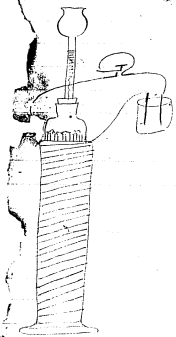
Monday 26 July 1875

Had just made an experiment to find out whether we could make a column of water rise & fall by the expansion of a magnet in it when a current passed round it

We took a glass measure & put inside a number of iron rods & then wound 3 layers of coarse cotton wire on. We then filled it up with water & pushed the cork with a glass tube fitted out down in it so that the water was half way up the tube. When we closed the key the water seemed to rise gradually in the tube from what cause we do not know as it did not recede when we opened the key. Perhaps it may be that the iron is absorbing water under the influence of electricity around it. Will try further experiment

T A Edison
Chas Batchelor

TAE



Edison

Monday Aug 2nd 1875
Made ink darker colored by
Glycerine 1 fluid oz
Aniline Red 3 grs
Aniline Violet 3 grs
Carmine 10 3 grs
Hydrochloric Acid 3 grs
small quantities of each

Edison
Batchelor
Adams
Samuel Edison

TAE
J. A.

8hrs

Wednesday Aug 4th 1875
Tried electromotograph for repeating
Noticed a peculiarity about it that it would drop dots clean out
Another thing we have noticed about it is that we sometimes work a long time before it will work & then it suddenly commences to work & it will work anyhow we fix it & we dont know ~~at present~~ how we have fixed it to make it work.

T A Edison
Jas Adams
Chas Batchelor
Samuel Edison

TAE
J. A.

12hrs

Aug 5th 1875

Electromotograph.

E-1676

We found Sesquichloride Iron
Sider
& Oil of Almonds
new good showing most on light
pressure & nearly any paper.
Had the electromotograph altered from
chain to drum & weight. When the
Electr. is in use on line it must be
turned by a crank & on the same table
a receiving instrument can be put in
by rocker so that the repeater man
can see how it is coming at any time.

T A Edison
Chas. Batchelor
Jno Adams
Samuel Edison

Aug 9th

Worked on Electromotograph all night
no particular result.

E. B. & A.

Aug 10th

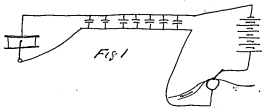
Electromotograph all night
Got it working on short circuit & repeating
600 words per minute with 10,000 ohms in
transmitting circuit. by adjusting lever of
Electromotograph very close it requires much
less spring & wanted very slight spring
so you could run any speed from 10 to 300
words without altering adjustment.
Called up Cogger of a & P & had him transmit
through a line composed of a wire to Philadelphia
& back & then to Newark by old Atl. wire about
(230) two hundred & thirty miles. and 5 cables
We found now that although we got it perfect on the electro-
motograph paper we could get nothing
intelligible on the repeated circuit. This was
very strange as we had been able to get
it on a 5000 ohm circuit in the laboratory
when we made marks on the paper of the electromotograph.
Now the difference between the 2 lines the artificial
& real was this; the artifical line had no
sending shunt or receiving shunt & no static
discharge, whilst our outside line had
a magnetic sending shunt & the static
discharge from about 230 miles of wire & cables.
the artificial was thus instantly opened
after each closure having no route for any-
thing such as static induction or whatever
else may be the cause to pass. Whilst the
outside line was never opened owing to the
sending shunt at Red Bank being in.
~~It was between 2 causes. Static induce or~~
~~the magnet in the sending shunt.~~ We now
put in a magnet shunt on our resistance trans-
mitting circuit & we could not get anything
although we got the marks on Electromotograph
very good; we now put in a plain resistance shunt
& we still could get nothing. We now came
to the conclusion that there was a secondary

action from the Autograph something like the secondary action from a magnet & as long as the line was shunted it there was an escape on it which is the same thing it gave a route for this secondary action to court & mutilate the signals. We shall now proceed & find out the nature of this secondary action.

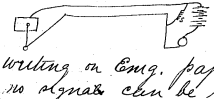
Thos A Edison
Chas Batchelor
Jas Adams
Samuel Edison

Aug 11, 12, 13, & 14th 1875

Electromotograph as a repeater.



1. With no condenser can get about 600 or 800 words per minute even in 10000 ohms and 25 cells carbon battery. 2. When shunt is added as in fig 2 with 200 ohms resistance we can get nothing although just as much current passes through the paper & the writing on Emg. paper itself is just as perfect no signals can be repeated at more than 25 or 50 words per minute. 3. Putting a 200 ohm magnet in the Shunt besides the 200 plain gives no better result. 4. Putting in but 1 cell of the magnet does no better.



5 Adjusting the cores from + to the armature no better. 6 Putting magnet in main line at transmitting end without Shunt no better.
6 Taking out magnet, keeping in shunt & adding 10000 ohms in line at receiving station. no better.

7 Adding magnet in main line with & without 10000 ohms no better.
8 Putting in a 5000 German silver magnet no result
9 Putting in 2 " " " " "
10 Shunting Emg with magnet no result
11 " " 2 " " "
12 Shunting Emg with plain resistance & adding magnet in branch containing Emg. a little better result.
13 Shunting Emg. with another Emg. in motion increases speed greatly but owing to the variation in the pressure which I held the Emg point & threw the other Emg out of adjustment constantly
14 By using a secondary battery of Platina & Platina immersed in Iyo sol. we got very fair speed but when we shunted Emg with a large condenser 8x6 the speed was the highest we have ever got from 1000 & 1100 words per minute perfect
15 When condenser was taken off could get nothing
16 By taking shunt off at transmitting end could get 600 or 700, the resistance, the resistance of line was 1000 ohms; the shorter the circuit the greater the effect of a closed circuit in which the secondary current or other disturbing force from the Emg. We are not sure as to what kind of a force circulates from the Emg after the battery is disconnected. The condenser seems to completely neutralize this secondary effect if there is any. The effect might perhaps be due to another cause to wit—

We have always noticed that on Hydrogen solutions when there is no static charge or lateral induction the first portion of a dot or dash is the strongest thus:—

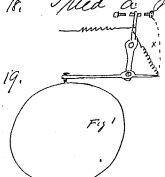
-- — — —

We have also noticed that the power of the Emg when worked by hand appears to be strongest on the first closing of the current & in working we have noticed that with certain adjustments when the circuit is first closed the lever moves with great power in a direction contrary to the revolution of the drum but immediately flies away from the contact point in the same manner as if the current had been so weakened that it had not enough power to hold it there though in this case the current was of constant strength. This phenomenon prevents an equal adjustment & as we have previously noticed most solutions through a resistance will 'tail' even in laboratory the addition of a shunt will in most cases stop tailing & make sharp writing hence the addition of a shunt only aggravated in this ~~the~~ case the phenomenon making writing perhaps thus - - - - - -

Throwing the Emg more out of adjustment the effect from a condenser would be to counteract this thus the first part of the current coming over the line would pass through the Emg & Condenser the portion which rushed into the Condenser to charge it would be withdrawn from that portion which would pass through Emg were there no condenser, hence the first portion is weakened but the condenser almost instantly becomes charged & the last portion of the current passing through Emg hence instead of dash being thus — it is — or perhaps even as regards the Emg phenomenon but in reality too as recorded thus — first part being weak & as the first portion of the current acts strongest on Emg. the lever comes forward with a certain force just as it would tend to weaken

& fly back as before mentioned the condenser is nearly charged & the current increases in strength counteract & prevent it. the discharge of a current of opposite polarity through Emg from condenser after battery is disconnected does not appear to effect it at all so may under these conditions be an advantage.

18. Tried a new lever on Emg thus:-

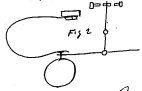


19. It could not be made to give a single movement with spring as x neither could it by putting it as shewn in dotted lines after almost giving it up as a failure found that by holding my finger on the platina friction points that at times when working a key I would get a very strong movement after further experiment we found that if I held my finger on so as not to cant the lever from or towards me & thereby prevent friction in the fulcrum I could get the movement. We therefore concluded that slight frictions in the moveable lever of the Emg was of far greater importance than I had heretofore supposed. I then had levers taken out & shoulder screw eased up & burnished so as to diminish the friction as much as possible although far too great after it was done

20

21

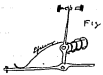
22 then tried it & so putting on spring as in fig 2



we succeeded in repeating without shunt about 600 words per minute this shows that at high speeds & with tailing etc there is great difference in the frictions although the lever responds so noticeably & conveys the idea of a great difference & that it takes but slight friction in the fulcrum of the moveable lever to neutralize completely the

23 little difference we also tried putting spring as in

fig 3 it did not work but it was before had bearing were eased it write perhaps work with frictionless bearings



24. Best Emg solution ever saw on H.
Lactate Zinc
Salt
Caustic K
Peroxylitte spirit
Note Caustic Potash is better than Sol alone & together.

25 Silicate of Soda
Salt
Note. Oxygen splendid slip almost as good as reg. on H. On H it is very slight though plenty to work Emg. the trouble will be that the Sil Soda dries to crust & it becomes insensible in a few minutes. Peculiarity on H is that paper is quite slippery without current hence pen is not clutched by normal friction so fiercely when current is off as in ordinary sol.

26 Nitrate Lead
Caustic Potash
As for Emg on H Slight slip on O.

27 Salt added to above but no better

28 Coffee
Salt
Sulphate of Quinine
No good
Added Caustic Potash & decreases friction on both sides Excess of Caustic K makes slip on O almost as good as reg on H but H is reduced.

29 Fuchs
Salt
Good as regular on H & cheaper

30. Borax
Salt
Muddling good on H & slips very slightly on O. Caustic K added no better on O, good deal better on H Bi Sulphate of K added makes slip on O better than any above

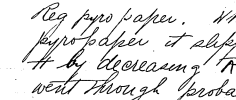
31 Glycerine Water & Sugar,-
Friction on H & O, O strongest
Added alitter KI On Zn & Pt only
O's friction increased very much, on both sides about equal used flat flat plate
Salt added, slight slip on H but increased friction with O on all metals.

32 Boss solution
Coffee, milk, sugar, & eggs, Caustic K & salt, equally good on both sides perhaps a little better on H but by proper proportions can probably make them equal

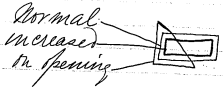
T. A. Edison
Chas Batchelor
James Adams
Samuel Edison

Monday Aug 16 1875.

1 Discovery of a new Phenomenon on the Metals on Hand Emg.
Aluminium Nickel Zinc Sn platina Brass Silver Lead.
2 cells Carbon battery new. Key + Rheostat thus



Reg pyro paper. When all current passed through pyro paper it slipped on all metals with it by decreasing R so that a small portion went though probably + all the metals except tin showed an increase in friction on passing the current but tin better showed the slip, but by still further shunting the current so that but little passed though, tin stopped slipping + increased its friction. Another noticeable thing was that when all metals except tin had an increased friction on the moment of closing the normal friction was increased say 10 degrees on opening the friction was increased 20 degrees but almost instantly subsiding as soon as the current was interrupted the friction was frightful strong.
The friction may be represented thus:—
Normal friction ——
Increased " ——
Friction on opening —
or.

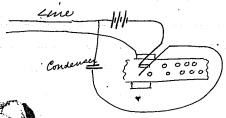


2 I then tried paper wet in a solution of Caustic Potash but on account of small current used it did not show anything being nearly as sensitive as ord. pyro.
3 I then put some salt (NaCl) in with the Caustic Potash when I found that this strip far excelled in delicacy the Pyro and gave an unexpected phenomenon
No increase of friction could be noticed on closing but all metals after the current was very much weakened gave no results except Zinc + this was very marked after all others even tin had ceased + the slip was noticeable.
This paper was the most valuable yet found + should be used on a Zinc drum

4 I have found that silver is even better than zinc on a very low current though on an exceedingly fine current zinc may be better. Aluminium appears well on a fine current + is all slip with strong momentary opening friction.
5 Dull wood paper + it appeared better than common fibulous perhaps thick wood paper would be better
6 I give Zinc the preference over silver on a low current on thick wood paper
7 Platina is exceedingly bad gives very little with full current but on Zinc muddling
8 Silver slips on both + + O but O very slightly perhaps some others do but not noticeably
9 We wet 2 rolls of Caustic K + NaCl + used on Emg. found that with sending shunt 1500 ohm + the condenser that we could by shunting Emg. repeat slowly so that it could be heard though

very ragged, without shunt nothing

10 With the arrangement in fig 3. words could be read but they were some what ragged there is something in it this weakens the first part of a dash & leaves the end the full strength, as the first portion of battery current has two routes the line & condenser & until condenser is chg full current dont go on line the second roller pen short circuits the condenser through the discharging holes & prevents its charge going on the line with the potash & pall paper highest speed straight 1500 ohms & 25 cells battery that was ever obtained about 1200 words per minute.



11 With the new lever we could get high speeds but the repeating contact was very inferior for some reason we had no spring on platina point yet. I am under the impression that the old straight lever vibrator would do good repeating without a spring; we intend putting on spring on new lever to test contact.

12 The lever used with the potash salt paper was the old style. After getting 1200 words per minute straight (ie) 500 ohms I shunted Emg. with 100 & also 1000 ohms but could get nothing readable at 45 words per minute this shows that some powerful secondary force action or otherwise circulates within the closed circuit which throws whole thing out of ~~circuit~~ adjustment.

13 We have found that the thin wood paper used for perforating answers admirably for Emg it is more even & less friction than rag paper used for receiving but ruffles up with pressure & requires dampening after wet overnight with Nacl & KCO

We now 5.30 am are going to make various Emg solutions for test on Emg (hand) to endeavour & obtain a paper free from this secondary phenomenon

14 Sulphate of Copper increases friction on H very powerfull when not shunted when not shunted on O it increases friction when shunted it slips best on Zinc

15 Bichromate Potash on H feel slips slightly, on O feel friction great vibrating, shunted, friction best on silver shunted lower still friction good on silver

16 Sulphuret of Potash nothing on any except slight thump on silver on H

17 Tartaric Acid nothing

18 Grape sugar friction great on O platina & Silver best

19 Borax friction increased on O platina & Silver, nothing on H

20 Cream of Tartar nothing on either

21 Carbonate nothing (insoluble)

22 Hyposulphite of Soda nothing on O slips on H good best on platina & silver latter perhaps better, even shunted does same

I have 2 cells 45 ohms in main line & Hand Emg. shunted with or without 20 ohms

23.- Hyposulphite Soda & Sesquichloride Iron checked nothing on O. Friction increased on H but nothing noticeable when shunted

24 Hyposulphite Soda } makes black mark
Sesquichloride Iron } on platina with
HCl platina might be
built up for a platina solution.
Tartaric acid dont improve mark
Grape sugar " " "

25 Sulphate Zinc slight slip on O
Friction considerable on H

26 Uric acid very slightly increased friction in O

27 Ordinary pyro acid one way & then another valide 2 minutes from same pole I think phenomenon must be in Platina absorbing gas.

Thos A Edison
Chas. Batchelor
James Adams.
Samuel Edison

Aug 14th 1845

Electromotograph

1 Sulphate of Zinc: apparently insoluble nothing,

2 By sending reversals H increases friction greatly apparently normal friction on O, shows slightly shunted 2 cells carbon through 20 ohms gives black mark with platina on H work it up.
added nitrate of ammonia, mark immediately fades, but slips very slightly on O, nothing on H, increases on O when on silver

3 added Caustic Potash no mark
Slips little better on O dont increase on H added salt nothing.

4 ~~Chlorate~~ Nitrate of Manganese decrease slightly on H
Nitrate ammonia added nothing
Salt added nothing

5 Oxalate Strontia nothing
apparently insoluble

6 Chlorate Potash nothing
added Hypo sulphate Soda nothing

Increased battery here from 2 to 5 cells

7 Tungstate of Soda increase very slightly on H decrease on O

8 Tungstate of Soda & Salt slips slight on H also shunted increase slightly on O.

9 Nitrate Magnesia slips slightly on H no extra friction on opening nothing at all on O, addition of Caustic Potash nothing extraordinary

10 Nitrate of Lime slips fair on H
gives mark on H when over silver that
develops in course of 20 H. 20 seconds
very red.
Addition of Nitrate of Silver apparently
marks on both sides best on H will
mark without current but soon wears off
very Tailey (Phenomenon)
Nitrate of Ammonia added to Nitrate of lime
+ nitrate of zinc makes very black closing
polarizes fearful (Phenomenon)

11 Hyposulphite Soda no better but not so
much polarization tailing marks
Caustic Potash added mark sharp + good
fair platina Solution
Nitro added makes marks worse
For Cmg no good.

12 Glacial Phosphoric acid slight slip on H
Caustic Potash added mix

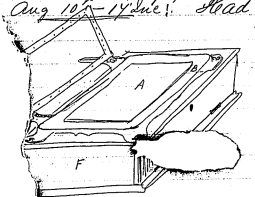
Thos A Edison
Chas Batchelor
Jas. Adams

Aug 14-1875

Aug 14 1875

Copying Experiments

Aug 10th-14th Inc.: Had press made like this



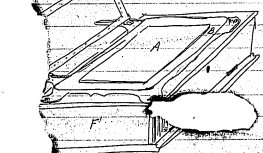
F is a cabinet
B is an iron frame cast
C is a frame with needles
in it put the copy down
hinged at E + D is the
support for C when you
are putting in the letter.
The difficulty we found was
that the pins would stick through the copies
pick them up, so we wanted something
that would hold the letter + not interfere
with the copies. We altered the frame C
the + put 4 clips in the corners like this

but we wasted no time on
this as it was a
palpable failure we
then had it altered to just 3 little points
in the corner but this would not do then
Batchelor put springs on like this, flat spring
with points. it worked first
rate when you put the paper
in you raise the springs
with the adjusting screw
put the paper under + press
[illegible] be im-

Aug 14 1875

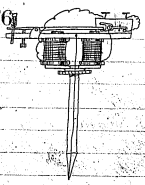
Copying Experiments

Aug 10 – 14 Inc.: Head press made like this



F is a cabinet
B is an Iron frame can
C is a frame with needles
in it put the copy down
hinged at E & D is the
support for C when you
are putting in the letter.
The difficulty we found was
that the pins would stick through the copy
pick them up so we wanted something
that would hold the letter & not interfere
with the copies. We altered the frame C
to & put 4 clips in the corners like this
but we wasted no time on
this as it was a
palpable failure we

then had it altered & put 3 little points
in the corner but this would not do then
Batchelor put springs on like this, flat spring
with points. It worked fine
rate when you put the paper
in you raise the springs
with the adjusting screw
the paper under & press
must be im-
[illegible]
[illegible] will
not do
[illegible] it cl[illegible]
must be [illegible]
[illegible] on with a rag
[illegible] rolled lightly with a
[illegible] rubber like a wringer
[illegible] with cloth



Ordered Gilliland & Co to make a pen like this with coarse wire. Altered Engine pen to double armature spots but no good.

Tried taking copies from pa[illegible] wet pad with ink & lay letter on it now lay a sheet on & roll it with a plain day [illegible] but not so handy as the other.

We find we can take Photographs with the process we took a photograph & pricked all over but not so deep as to go through & raise the surface we then smear ink on & rub off again there will be enough ink in the holes to make a splendid copy by pressure.

Tried soaking paper in resin dissolved in alcohol but no good for writing on.

We find the foolscap we have here is not so good as the large letter because the thinner & more liable to blot [illegible]

Newark N. J.
Aug 16 1875

Dear Genl,

Unforseen circumstances prevented one from gathering information as to whether the proper inducements for the so-called cosmiogherapheticalighthonicosmopolitanschtrum were really of the nature required by the parties interested in the propogation of a species of Bacteriumbacinchthinticus under the efficient management of the members of the Society for providing the gospel to the Guano islands. Hustling to hear from you on the subject soon

We remain
very respectfully.
Simeon Shivers
Sectry.

Thos. A. Edison
Chas Batchelor
James Adams
Samuel Edison

Your is the winter of our discontent made glorious summer by this son of York and all the clouds that lowered upon our house

Aug 18th 1875

Extra Notes on Electromotograph.

1 With the Cuneta Potash + Na Cl paper we can on plain line without shunt get 1200 a minute recorded on second circuit thus:—

2 with high resistance shunt: - ---- -- -- ---

3 " " at slower speed - ---- -- -- ---

4 lower resistance in shunt - ---- - -- --

5 with less. - ---- -- -- --

6 with 200 in shunt - ---- -- -- --

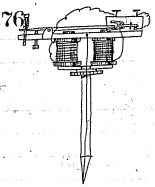
7 with less nothing dashes being ~~nothing~~ + gets nothing. This shows that the Emg throws back a secondary charge, precisely like a condenser what appears to be so strange is that so small a surface as a platina point should send so powerful a discharge almost equal to the current which passes only 1000 ohms from 25 cells of battery. The problem thus resolves itself into some paper in which there shall be a chemicals that will not polarize + give back charge + yet be sufficiently delicate to allow the lever to move at high speeds.

8 Last night tried the experiment of breaking the circuit very rapidly with a revolving breakwheel with half closure + half opening but it did not give very

9 good results in fact not any. Then tried

10 1/10 closure + 1/10 opening no better, resolved slow + fast no better

11. Tried a chuset + connected a magnet of 200 ohms (Edison pat) in thus:



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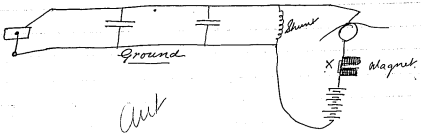


Ink

The object of inserting the magnet in the circuit between the battery & the instrument was to weaken the first part of every signal sent having the last part full strength & cut off sharp for instance on closing the circuit passing through the magnet meets the self induction current from it & is weakened but quickly gets full strength as induction current dies away, on opening the extra current from the magnet has no place to circulate it being broken entirely by the perforated paper cannot go on the line & producing the mark the record should be thus :-

— ---- — —

As has been previously mentioned the Eng record where there is no static is thus well a straight current.—

— ---- — —

I thought that the above would compensate & make it even, for some reason could do nothing probably because we had to use a shunt & the secondary charge from the Eng threw it out of adjustment as above described.

I find that it wont do to have too light a pressure on the lever of Eng, the delicacy is apparently increased by pressure

T. A. Edison
Chas. Batchelor
Jas. Adams
Samuel Edison

Aug 22nd 1875 Batteries.

In experimenting with mucillaginous substances in the porous cells of batteries to prevent polarization we have found that they do in a great measure prevent it.

Thus Silicate of Soda & Caustic Potash in a carbon zinc battery shews a deflection on high resistance Coil No 1 of Bradley galvanometer of 55 degrees after 24 hours 50, after 65 hours 46 degrees.

With mucilage & chloride of Ammonia at first 30 degrees then in a few minutes it appeared to polarize & run down to 24 at which it stands after 63 hours Glue & Caustic Potash very change by all again:—

Thos. A. Edison
Chas. Batchelor
Jas. Adams

Aug 23rd 1875. Monday.

Battery Experiments.

W. F.

Clean cell – Carbon & Zinc
2 part water 1 part Glycerine in porous cup a few pinches Chl Ammonium in outside & in porous cell
Bradley Galvanometer & left short circuited

	1	2	3	4	
12:10 PM	30	18	5	4	Aug 23
2:31 PM	22	12	3	0	
2:00 PM	14	8	2	½	Aug 24

No 2. British Gum & Chl Amm in porous cup & Chl Amm outside

	1	2	3	4		
Aug 23.	33	29	21	3	2	24 PM
24	15	11	5	1	2	PM

No 3. British Gum & Caustic K

	1	2	3	4		
1875						
Aug 23	37	35	33	5	2	24 PM
24	13	10	5	½	2	PM

No 4 Silicate Soda & little H O in porous cup H O outside & Sol of Cyanide K out Fin

	1	2	3	4		
Aug 23	48	45	52	9	2	46 PM
24	16	10	3	½	2	PM

No 5 Gum Olibanum + Water porous cell
Chl Amm in + out Short circuit

1875	1	2	3	4	
Aug 23	61	60	79	29	3 40 PM
24	8	8	10	3	2 PM

No 6 Mucilage + Caustic K

	1	2	3	4	
Aug 24	16	13	7	1	2 PM

Aug 23rd 1875
Electromotograph Experiments

1 Made line equal to (Buffalo wire) that is only just to be got at 150 words per minute + poor at that
We got 50 per min through Eng with paper dipped in solution of
Water 10
Caustic K 1. Standard Sol
Silicate Soda 2

0 What we want to find now is a solution to wet the paper with that will do better than this

2 Coffee, sugar, milk, + eggs, nothing
3 Silicate Soda + Chl Ammonia solidifies
4 Dextrine + Caustic K mix
5 Kerosene Glycerene + Caustic K mix
6. Boracic Acid Tannic Acid + Caustic K with no shunt on at Eng can get about 10 per minute comes all mixed up + not very reliable
7 Gum Kino + Caustic K
About 10 words per minute full of dots perforce no shunt on Eng.
8 Citrate Lime + Mucilage + a few drops of Silicate Soda no good

9 Cyanide K only mix
10 Gum myrh + Caustic K mix
11 Annatto + Caustic K mix
12 Chl. Amm + Gum Arabic mix
13 Sulphate Lode this nothing at well
Blot tered paper.
14 Grape Sugar + Caustic K mix
15 Sulphate Magnesia mix
16 Gum Olibanum Caustic K mix

17 Logwood & Caustic K
about 20 words good for further experiment
18 Fustic & Caustic K no good
19 Common Lard oil no good
20 Logwood, Caustic K & Salt no
21 Logwood, Caustic K, Pyrogallic acid } good for 20 words.
22 Nitrate of Ammonia nil
23 Valeriate of Zinc not good try again
24 Protochloride Sn no good though I think it may be with something
25 Soap, Caustic K } 20 words without shunt try again
26 Acetate of Strontia nil
27 Citrate of Potash got about 40 words per minute at one time there is something in it

Thomas A Edison
Chas. Batchelor
James Adams
E. H. Johnson

1875

1 Aug 24 When certain chemicals are placed in a solution of Silicate of Soda water there shoots up from the crystals beautiful forests or trees in some instances reaching to the top.

2 Chloride of Iridium gives very thick trunks like trees while nitrate of cobalt gives thin long grass.

3 Sulphate Manganese shews growing from the crystal very fine thick white glass the Chl Iridium is like cactus & grows large

We find that after tree is formed, if destroyed it dont grow again in the

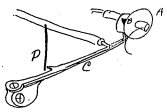
air bubbles carrie the chemicals up & Silicate of Soda being thick goes slow & every part of the chemical that is carried up is precipitated forming hollow trunks or grasses

Electromotograph

We have found that when pyro paper is used on any of the metals (platina included) that by drawing the platina stylus connected to the Zinc of the battery over the paper a great number of times that there is deposited an insulating substance on the metals underneath & on a very short time no marks can be obtained except the paper is very wet or the paper only damp but with great pleasure Sin acts worse than platina

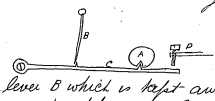
Thos. A. Edison
Batchelor
E. H. Johnson
Samuel Edison
Jas. Adams

Aug 23rd 1875
Next stop movement for Domestic Recorder Had the stop altered whereas before it was stopped by the lever being brought sideways to stop the vibrating pin as in fig 1 A is a shaft of recorder carrying a collar on which is a small cam of glue B which when it comes round



to pin on end of lever C pushes it over so as to engage D the vibrating pin, however sharp the point is made on lever it will sometimes strike right on point & instead of going on one side of pin it strikes & bends it at each

times when the circuit is opened it fails & release & consequently the recorder does not start soon enough in order & obviate this we have arranged it in this manner Fig 2



When magnet is closed the screw D has thrown lever C out of r & consequently away from lever B which is kept away by a turning round & r rubbing on periphery By this arrangement that strain is done away with which occurs when the two strike on their extreme edges, in this case if they do it does not matter as the screw D knocks it out of the way entirely & does not depend on a spring

Thos. A Edison
Chas Batchelor
E. H. Johnson
Samuel Edison
Jas. Adams

Aug 24th 1875

Electromotograph Experiments Repeating.

We tried 19 different solutions for repeating on Emg & then put on the regular standard Silicate of Soda solution as we could get nothing we found the regular would not work up to 75 but gave dash letters only found that the dot roller in transmitter was all dirty & immediately cleaned it & tried reg (page 283) keeping the wire under same conditions of Suffolk wire page 283:-

Not
Acetate of Mercury }
Silicate of Soda }
Splendid Can get shape of words at 500 words per minute get it good at 150 words by shunting it very low 40 ohm

magnet r. 30 plain gold good at 200 — 300 words per minute It is hard & break up into dots at high speeds, but it has the feature that no extra motions are made & that it repeats just as current comes over line thus ---- First dot weak repeats weak We believe that this solution will give all that is desired & will repeat signals into a second circuit so they can be recorded direct on Ferrid paper

The words are unbroken at 500 words per minute

Lycopodium
Silicate of Soda
Not much good say 25 words a minute it throws in extra dots at 40 words.

Acetate of Lime no good

Chloride of Uranium no good

Citrate of Potash (white) not very good (extra dots)

Potassic acetate of Uranium not much good.

Bichloride of Mercury can read it at 125 words geeces it at 150 (extra) something in it I think

Oxalate of Cerium not much good cant shunt it low.

Hydrobromate of Ammonia nice

Nitrate of Zinc — mix

Nitrate of Magnesia — mix

Sulpho Carbolate Soda — mix

Carbazotic Acid — mix

Sulphate Morphia — mix

Sulphate of Manganese — mix

Phosphate Soda — mix

Muriate of Bisemine — mix

Caustic Magnesia — mix

Acetate Mercury alone — very good

Acetate Mercury } this combination makes
Silicate Soda } all that is desired

Thos A Edison

Chas Batchelor
E H Johnson
Jas. Adams.

Aug 25 1878
Electromotograph Repeating

Acetate of Mercury & Caustic Potash is best yet

Acetate of Mercury is good if you have a large amount as it does not dissolve well.

Nitrate of Mercury is good but you must use it without shunt but not very sensitive.

Acetate of Mercury } nothing
Nitrate of NH_4 }

With Acetate of Mercury } No 1
& Caustic Potash }
Sample was repeated at 23½ words per minute shunted with relay ½ ohm not readable direct & besides the current is so weak when shunted you dont get any current showing the extreme delicacy of Chg.

Acetate of Lead } very sensitive but
Caustic Potash } closes in the spaces.

Thos A Edison
Chas Batchelor
E H Johnson
Jas. Adams

Aug 26 1875

Batchelors stock Printer

An alteration in this instrument was the formation of the letter by the aid of 4 pens in order to make the figure 8 plainer it works well & this was taken to day. The pens work better rigid instead of having up & down play.

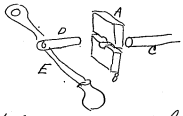
Chas B Batchelor.
Thos A Edison
E H Johnson

Aug 26 1875

Gaspipe threading

A few methods of putting threads on gas pipes & inside.

1st Heat the end & put on by pressure in the following manner



The two half dies A & B are worked by pressure just in pipe C under the dies A & B then pull ram D in the tube & put on thread by pressure on A & B

2 In drawing leave it bell mouthed & press it down

3 Find some way of eating it out with acid.

4 Make the end smaller than tube & drive plug in & force up into a die.

5 Use an iron disc running rapidly & make pipe feed the pitch of thread & also turn forward

Thos A Edison
Chas Batchelor
E H Johnson
Jas. Adams.

3 lbs. 7 oz
36 mice
Gelelands